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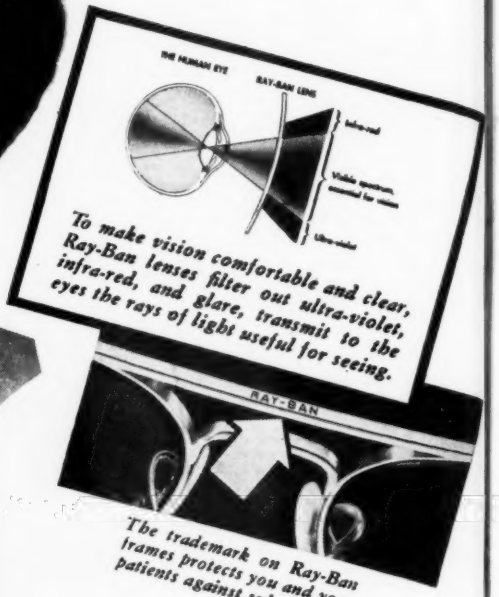

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AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 31 APRIL, 1948 NUMBER 4

SOME CONFUSING FACTORS IN THE DIAGNOSIS OF PARALYSIS* OF THE VERTICALLY ACTING MUSCLES†

THE JACKSON MEMORIAL LECTURE

FRANCIS HEED ADLER, M.D.
Philadelphia, Pennsylvania

During his career, Dr. Edward Jackson wrote over 600 articles. The list of subjects covers the entire field of ophthalmology. Beginning in 1882, the first paper listed in his bibliography is "A Comparative Study of the Action of Certain Mydriatic Alkaloids," and the last entry, in 1926, is entitled "What Is Cancer?" This should allow any Jackson Memorial lecturer plenty of freedom in the choice of a subject, even if he wished to confine himself to one of Dr. Jackson's interests. I have elected to discuss some of the difficulties encountered in diagnosing vertical ocular muscle paralyses. I find some of Dr. Jackson's best writing and many of his original ideas are contained in his papers on strabismus. Everyone interested in operations on the ocular muscles should read his paper on the "Principles Controlling Operative Interference in Squint," published in the *Transactions of the Section on Ophthalmology* of the American Medical Association in 1902, and "Operations on the Extraocular Muscles," published in the *Ophthalmic Record* of 1923. Both of these papers are splendid, and each would today make a truly great Jackson Memorial Lecture, as in fact they did when Dr. Jackson himself presented them in his characteristic style and in that unforgettable voice of many decibels.

Paralysis of a lateral or medial rectus muscle seldom causes any difficulty in diagnosis. The signs and symptoms generally follow those described in the textbooks. This is not true of paralysis of the vertically acting muscles. Although textbooks describe the typical strabismus, the theoretic diplopia fields, and the characteristic reactions to the embarrassment, such as face turning and head tilting, which one should encounter for each muscle paralyzed, in many instances when patients are examined, the findings cannot be made to fit the picture of a single paralyzed muscle.

On reviewing a series of case histories of ocular muscle paralyses, it was found that in a number the data indicated a paralysis of two muscles instead of one, which caused confusion in making a diagnosis. This was borne out by an analysis of the varying angle of strabismus in the oblique positions of gaze, measured by the cover test and the fixation fields, and by the characteristics of the diplopia fields. These cases could be divided into two groups. (1) Those in which the two muscles seemingly paralyzed could not have been caught by any one single lesion. The muscles of these cases were either (a) the superior rectus of one eye together with the superior oblique of the opposite eye; or (b) the inferior rectus of one eye together with the inferior oblique of the opposite eye. (2) Those in which a single lesion could have caused the paralysis of

* The terms "paralysis" and "paresis" have been used interchangeably as it seems to labor the point to distinguish between varying degrees of weakness of a muscle for the purpose of this article.

† Delivered on October 15, 1947, at the convention of the American Academy of Ophthalmology and Otolaryngology, Chicago, Illinois.

both muscles. The explanation of the cases in this group is obvious. If, for example, both elevators or both depressors of one eye

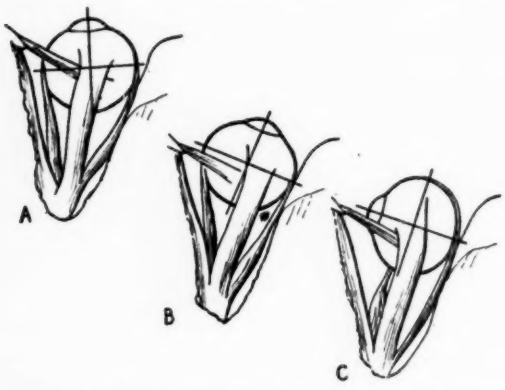

Fig. 1 (Adler). The right eye seen from above, showing the direction of pull of the superior rectus when the eye is in (A) the primary position; (B) abducted 23 degrees; (C) adducted 67 degrees.

are paralyzed, it is probable that they have been caught by a local process in the orbit such as scar formation or a tumor; or the nuclei of origin of the nerves supplying the two muscles have been involved by a lesion such as a hemorrhage in the pons.

The explanation of the cases belonging to Group 1 is not so obvious, since there is no place in the body where a single lesion could involve both of the muscles affected. It is the purpose of this paper to try to explain the cases in this group and to report some illustrative examples of cases belonging to the second group.

Group 1. The cases belonging in this group seem to have a paralysis of a superior rectus of one eye combined with a paralysis of the superior oblique of the opposite eye, or else an inferior rectus of one eye combined with an inferior oblique of the opposite eye. Since no single lesion in the body can produce such a combination of paralyzed muscles, what is their explanation?

The textbook description of paralysis of each of the ocular muscles is based on the varying action of each of the muscles in the different positions of gaze. When the eyes are in the primary position, the superior rectus, for example, will mainly effect an elevation of the globe. To this must be added a slight degree of intorsion and adduction (fig. 1A). When the globe is abducted 23 degrees so that the visual line coincides with the line of pull of the muscle, its contraction will produce nothing but elevation (fig. 1B). If the globe is adducted 67 degrees from the primary position (a degree of adduction never attained normally) contraction of the muscle produces intorsion and adduction (fig. 1C). The muscle's chief effect on the globe in one position of gaze becomes secondary or disappears altogether in another position, while a previously subsidiary effect now becomes predominant. This applies not only to the superior and inferior recti, but to the two obliques as well.

It is a simple matter to predict the strabismus and the diplopia fields which should occur in paralysis of any muscle, based on a knowledge of its action. This picture is based, however, on the effect which the paralyzed muscle has on the movements of this eye alone, and does not take into account the fact that the effect is never confined to the action of the paralyzed muscle alone but influences other muscles in the same eye and, under certain conditions, other muscles in the opposite eye, as well. This is always true when the paralyzed eye is used for fixation, following Hering's law of voluntary movements.

Hering's law states that in all voluntary movements of the eyes, the innervation sent down from the cortex is equally distributed to the muscles of both eyes concerned in that direction of gaze. When a subject voluntarily moves his eyes up and to the right, an equal innervation is sent to the right superior rectus and to the left inferior oblique. An equal inhibition is also sent to the corresponding antagonists of these muscles, according to Sherrington's law of reciprocal innervation. When a muscle is paretic, it requires more nervous energy to effect its movement than if it were normal. In patients with a paralyzed muscle, therefore, an

excessive innervation is sent not only to the paretic muscle, but to the yoke muscle in the opposite eye as well. If the right superior rectus is paretic and the patient looks up and to the right, with the right eye fixing, an excessive innervation will be sent to this muscle and to the left inferior oblique. This

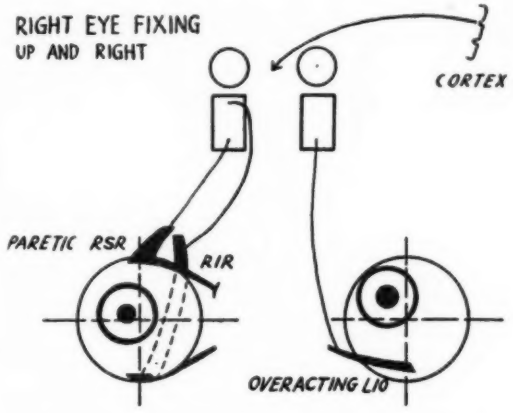

Fig. 2. (Adler). Diagram showing the secondary deviation of the left eye on looking up and to the right when the right superior rectus is paralyzed and the right eye is fixing. An excessive innervation is sent down from the cortex to both the right superior rectus and the left inferior oblique, causing overaction of the latter. Compare with Figure 3 in which the nonparalyzed eye is fixing.

latter muscle will therefore overact so that the left eye will move up too far (fig. 2). If the left eye is the fixing eye, however, the strabismus will be due entirely to the lag in elevation of the right eye. Under these conditions, the angle of strabismus will be less than when the right eye was fixing (fig. 3).

This is the principle that underlies secondary deviation, which is one of the causes of incomitance in paralytic squint. Incomitance in the angle of squint in paralysis of a muscle is due to two factors: (1) To the failure of the paralyzed muscle to move the eye in the field of its action, and (2) to the overaction of the yoke muscle when the paralyzed eye fixes.

In all cases of paralysis of sufficient severity to break up binocular vision, the eyes become dissociated and either the paralyzed or the nonparalyzed eye is used habitually for fixation. White (Tr. Am. Ophth. Soc., **31**:551, 1933) believed that the paralyzed eye was usually the fixing eye in cases of congenital paralysis.

Many different factors determine which eye will be used to fix. Visual acuity is sometimes a factor, and the eye with the better acuity may be chosen. This is not always the

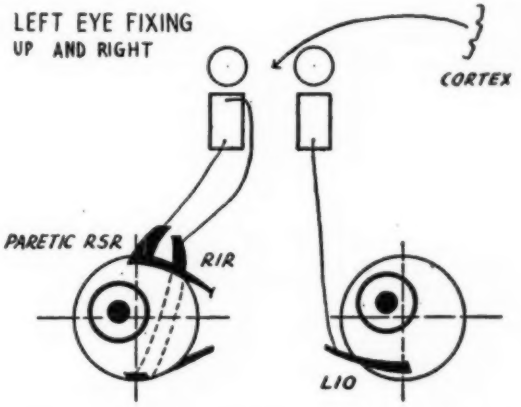

Fig. 3 (Adler). Looking up and to the right when the nonparalyzed left eye is fixing. The primary deviation is less than the secondary deviation in Figure 2.

case, however, and one may see patients in whom the paralyzed eye is used for fixation in spite of the fact that it has poorer vision than the nonparalyzed eye. Fixation with the paralyzed eye increases the strabismus due to secondary deviation. Some authors believe this is the reason why fixation is so frequently carried out by the paralyzed eye, since this increases the distance between the double images and therefore makes them less annoying to the patient.

In addition to the effect on the yoke muscle when the paralyzed eye is used for fixation, the effect on the antagonist of the paralyzed muscle must also be considered. Whenever there is a paralysis of a muscle, the antagonist in the same eye is able to move the globe in its direction of action with less effort than it does normally, since it lacks the restraining effect of the normal tonus of the now paralyzed muscle. This may seem to deny the existence of reciprocal innervation,

but does not necessarily do so. The relaxation which a muscle undergoes during contraction of its antagonist is only partial and considerable tonus is still retained. This is lost, however, when the muscle is actually paralyzed. If the right superior rectus is paralyzed, for example, the right inferior rectus can now move the eye down and to the right with less than normal effort. When the individual uses the right eye for fixation down and to the right, the innervation required for the right inferior rectus will be less than normal. A subnormal stimulus is sent, therefore, to the yoke muscle of the right inferior rectus; that is, the left superior oblique, and this muscle will underact with the result that the left eye will not be carried down as far as it should be (fig. 4). When the nonparalyzed left eye is used to fix in looking down and to the right, both eyes will move down almost equally well and there will be little strabismus (fig. 5). When the right eye is used to fix, therefore, the left superior oblique will appear to be paralyzed in gazing down and to the right. This has been called inhibitional palsy of the contralateral antagonist by Chavasse. This term is confusing, as well as being rather burdensome. Since it depends on the underaction of a muscle due to the principles embodied in Hering's law in the same manner that the overaction of a yoke muscle does, it would seem simpler to refer to it by the term "underaction." Unfortunately, some authors, especially Chavasse, use this term to indicate a contracture of the antagonist of a paralyzed muscle. When contracture of a muscle occurs, it is shortened and the squint produced by its shortening is comitant in all directions of gaze. Such a muscle is not underacting, and the term "underaction" of a muscle should be used only for the condition I have described above. As a matter of fact, we are quite ignorant of the changes which have taken place in muscles which are said to be contractured. This condition is seen clinically in severe paralysis of long standing, but to my knowledge no histologic examinations have been made of such muscles to determine whether they are fibrotic and shortened or hypertrophied.

Lancaster and others have emphasized the fact that the ocular muscles are at least 10 times as powerful as they need to be to effect the full rotation of the globe in the

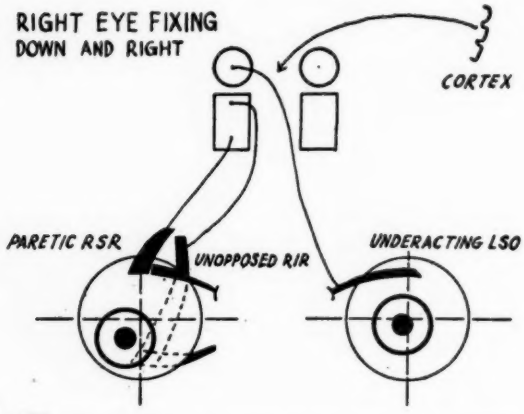

Fig. 4 (Adler). Looking down and to the right. The right superior rectus is paretic and the right eye is fixing. The right inferior rectus moves the eye down with less than the normal amount of innervation, since the opposing tonus of the right superior rectus is gone. Less innervation is sent to the left superior oblique, therefore, and the left eye fails to move down and to the right as far as it should. Compare with Figure 5.

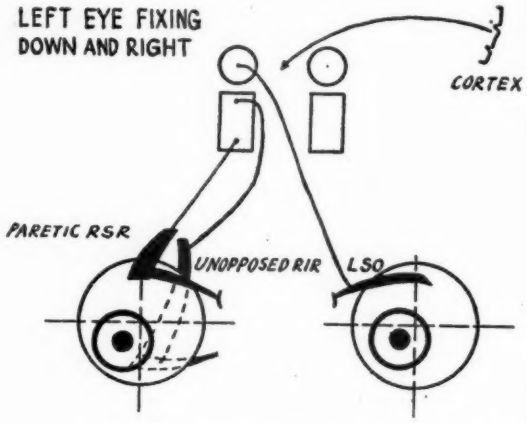

Fig. 5 (Adler). Looking down and to the right. The nonparalyzed eye is fixing and moves down normally. There is no underaction of the left superior oblique.

direction of their action. It is evident on theoretic grounds that each muscle has to contract only one fourth of its length in order to move the globe its full amount in that direction; whereas, most of the other muscles of the body contract to one half their resting length. Assuming that the circumference of the adult globe is 72 mm., a rotation of 1 mm. equals an angular movement of 5 degrees. The external rectus need contract only 9 mm., therefore, in order to produce an abduction of the globe of 45 degrees, which is the limit of movement of the eye laterally. Since the muscle is over 40 mm. long, this necessitates a shortening of less than one fourth of the muscle's length.

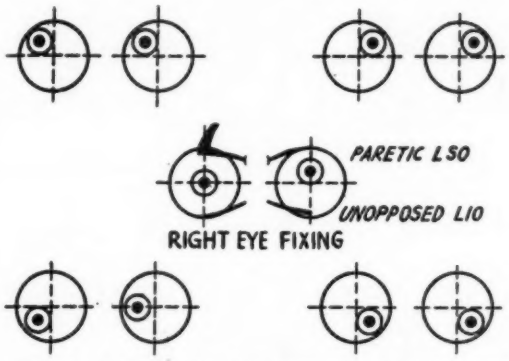

Fig. 6 (Adler). Showing the angle of strabismus in the primary and oblique positions of gaze in paralysis of the left superior oblique muscle when the nonparalyzed right eye is used for fixation.

It is clear that the strabismus found in the various positions of gaze will be quite different, depending upon whether the nonparalyzed or the paralyzed eye is habitually used for fixation. The typical strabismus given in textbooks for each paralyzed muscle assumes fixation by the nonparalyzed eye.

A comparison may now be made between the strabismus found when the nonparalyzed eye is used to fix with that found when the paralyzed eye is fixing. As an example, a paralysis of the left superior oblique muscle may be used. Figure 6 shows the positions assumed by each eye in the primary and the oblique directions of gaze when the nonparalyzed right eye is used for fixation. In the primary position, the left eye is too high due to the loss of tone of the superior oblique. The greatest vertical separation between the eyes occurs when the gaze is down and to the right, due to the weakness of the left superior oblique. In all other oblique positions of gaze, the eyes are in alignment.

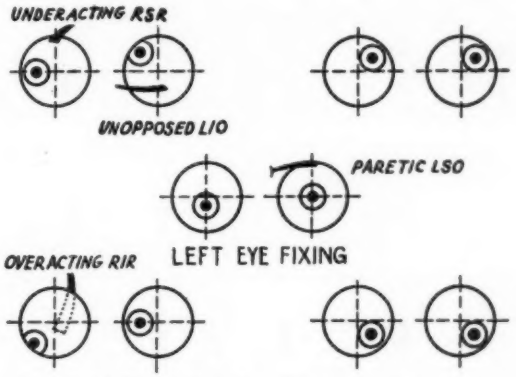

Fig. 7 (Adler). Showing the angle of strabismus in the primary and oblique positions of gaze in paralysis of the left superior oblique muscle when the paralyzed left eye is habitually used for fixation. Compare with Figure 6.

Figure 7 shows the strabismus in the various positions of gaze when the left, paralyzed eye is the fixing eye. In the primary position, the right eye will be too low and the angle of squint will be greater than when the nonparalyzed eye is fixing. The greatest separation of the visual axes will be in gaze down and to the right, and the angle of squint in this position will be greater than when the nonparalyzed eye was the fixing eye. This is due to the fact that the left eye fails to move down as far as it should and the right eye moves down too far due to overaction of the yoke muscle, the right inferior rectus. On gaze up and to the left and down and to the left, the eyes will be in alignment, but on looking up and to the right, the strabismus will increase again. The right eye fails to move up as far as it should in this direction, while the left eye is fixing. This is due to the fact that the left inferior oblique can move the left eye up and to the right with less innervation than normal, since the left

superior oblique is paralyzed. A weaker innervation, therefore, goes to the right superior rectus which underacts and this eye fails to move upward to the full extent. It will lag behind and appear to be paralyzed. If the left eye is covered, the right eye will be able to move up its full extent, showing that it is not really paretic.

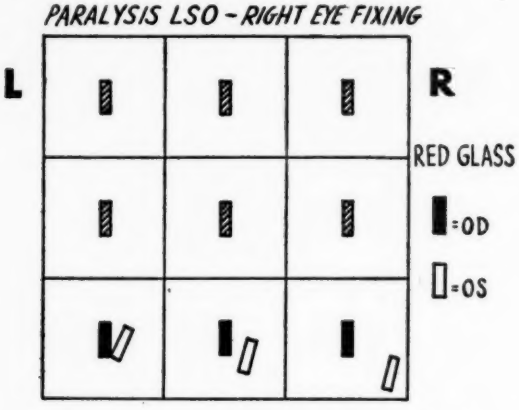

Fig. 8. (Adler). Simplified diplopia fields of paralysis of the left superior oblique as given in textbooks and found in patients when the nonparalyzed eye is used for fixation. Compare with Figure 9.

Whenever a superior oblique is paralyzed and this eye is used for fixation, one may have an underaction of the superior rectus muscle of the opposite eye. Similarly, if a superior rectus muscle is the paretic muscle, the opposite superior oblique will underact if the eye with the paretic muscle is used for fixation. The same condition will be found in paralysis of either the inferior rectus or the inferior oblique of either eye. One muscle is the paretic one, the other underacts according to Hering's law.

Corresponding to the differences in the angle of strabismus in various positions of gaze, one finds differences in the diplopia fields, depending on whether the paretic or nonparetic eye fixes. When the nonparalyzed eye is the fixing eye, the diplopia fields will generally be those given in the textbooks. When the paralyzed eye is habitually fixing, the diplopia fields will indicate two paralyzed muscles. Figure 8 shows the diplopia fields as given in textbooks when the left superior oblique is paralyzed. Figure 9 shows the diplopia fields frequently encountered, indicating both a paralysis of the left superior oblique and a paralysis of the right superior rectus. This type of diplopia field is found if the paralyzed left eye is the fixing eye. The involvement of the right

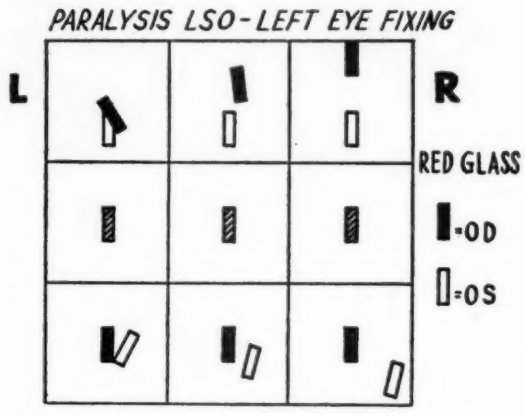

Fig. 9 (Adler). Simplified diplopia field in paralysis of the left superior oblique muscle found in patients who habitually choose to fix with the paralyzed eye. The fields indicate a paralysis of the left superior oblique and a paralysis of the right superior rectus.

superior rectus is due to underaction of this muscle and not to actual paralysis. This type of diplopia field is quite common. It should cause no confusion, if it is properly interpreted.

The varying angle of strabismus and the diplopia fields alone are not sufficient to enable one to tell which muscle is actually paralyzed and which muscle is merely underacting. I have called attention elsewhere (Arch. Ophth., 36:661, 1946) to the methods by means of which one may make a differential diagnosis in most cases between paralysis of these two muscles. Occasionally, it is not possible to decide which is the paralyzed muscle. Whenever patients are seen in whom two muscles appear to be paralyzed, and these muscles are a superior or inferior rectus of one eye, combined with a superior or inferior oblique of the opposite eye, one should recognize that one or the other muscle

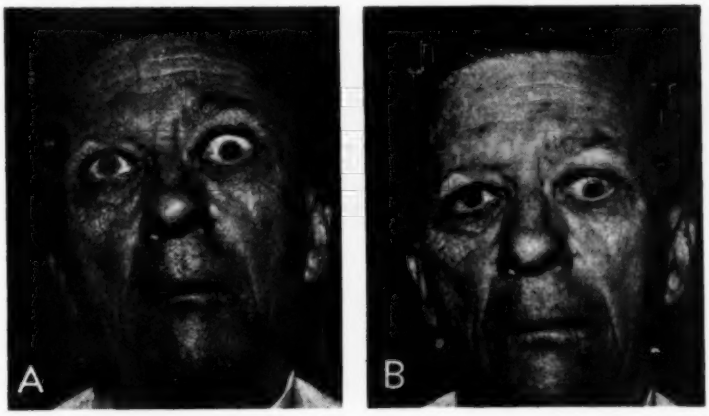

Fig. 10 (Adler). *Case 1.* Paralysis of the left superior rectus and left inferior oblique. (A) Left paralyzed eye fixing. (B) Right nonparalyzed eye fixing.

is actually the paretic muscle while the other is underacting due to habitual fixation with the paretic eye.

Group 2. The second group of cases are those in which the two muscles paralyzed are caught by a single lesion in the pons or the muscles themselves are involved in the orbit. The muscles paralyzed may be the elevators or the depressors of one eye or both superior obliques. Cases of supranuclear paralysis and paralysis due to myasthenia gravis have purposely been omitted from this discussion.

Anatomists are generally agreed that the muscles for elevation of the eye; that is, the superior rectus and the inferior oblique, have their nuclei of origin in the extreme anterior portion of the ipsilateral third-nerve nucleus. These cells all lie very close together and may easily be caught by small lesions in this region, such as a hemorrhage. Patients with a unilateral paralysis of the superior rectus and inferior oblique, either with or without ptosis, due to a small hemorrhage in this region, are frequently seen. (Kirby, D. B.: Arch. Ophth., **35**: 199 (Mar.) 1946).

Case reports

Case 1. Mr. C. L., aged 65 years suddenly began to have vertical diplopia without any antecedent injury or illness. Examination showed a paralysis of the left superior rectus and left inferior oblique. Figure 10A shows the position of the eyes in the primary position when the left paralyzed eye is fixing, which is habitually the case. The right eye is elevated 25 degrees (secondary deviation) and the left upper lid is tucked due to overaction of the left levator consequent to the paresis of the left superior rectus. In Figure 10B, the nonparalyzed eye is fixing and the left eye is down 15 degrees.

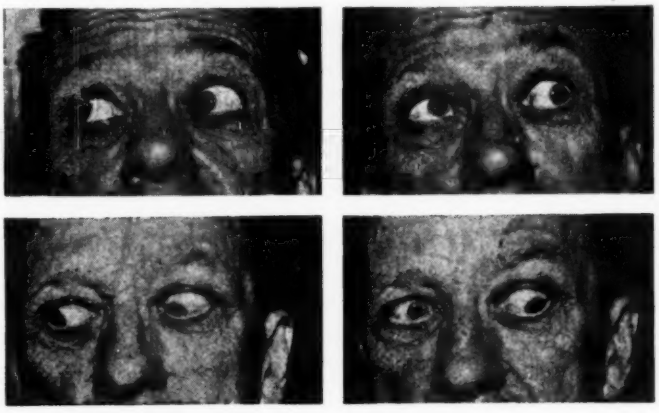

Fig. 11 (Adler). *Case 1.* Angle of squint in the four oblique positions of gaze with the left paralyzed eye fixing. (A) Overaction of the right superior rectus. (B) Overaction of the right inferior oblique. (C) Underaction of the right inferior rectus. (D) Underaction of the right superior oblique.

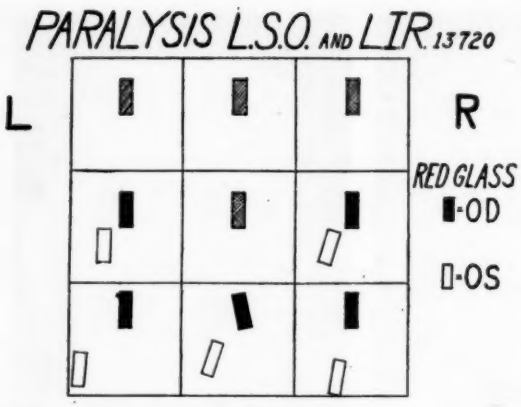

Fig. 12 (Adler). *Case 2.* Diplopia fields in paralysis of the left superior oblique and left inferior rectus. Right eye fixing.

Figure 11A shows the eyes up and to the right. The left eye is fixing, and the right eye overshoots due to overaction of the right superior rectus, the yoke muscle of the paretic left inferior oblique. In Figure 11B, eyes are up and to the left. The left eye is fixing and the right overshoots, due to overaction of the right inferior oblique, the yoke muscle of the paretic left superior rectus. In Figure 11C, the eyes are down and to the right. The left eye is fixing, and the right fails to move down as far as it should, due to underaction of the right inferior rectus, the yoke muscle of the left superior oblique. In Figure 11D, the eyes are down and to the left. The left eye is fixing and the right fails to move down as far as it should due to underaction of the right superior oblique, the yoke muscle of the left inferior rectus.

Studies of this patient showed nothing except advanced arteriosclerosis and hypertension. He has been under observation for a year. The final diagnosis is "paralysis of the left superior rectus and left inferior oblique due to a lesion, probably vascular, in the left third nucleus."

Case 2. Mr. J. A., aged 31 years, had an auto accident in June, 1946, and suffered severe contusion of the brain. There was no injury to the face. He has had vertical diplopia since then. Vision is 6/7.5 in each eye, with correction. There is no detectable strabismus except on covering so that the eyes are dissociated. The strabismus indicates a paralysis of the left inferior rectus and the left superior oblique. This is borne out by the fields of fixation on the Hess apparatus and the diplopia fields.

Figure 12 shows the diplopia fields. Figure 13 shows the fixation fields measured on the Hess charts, indicating a paresis of the left inferior rectus and superior oblique and

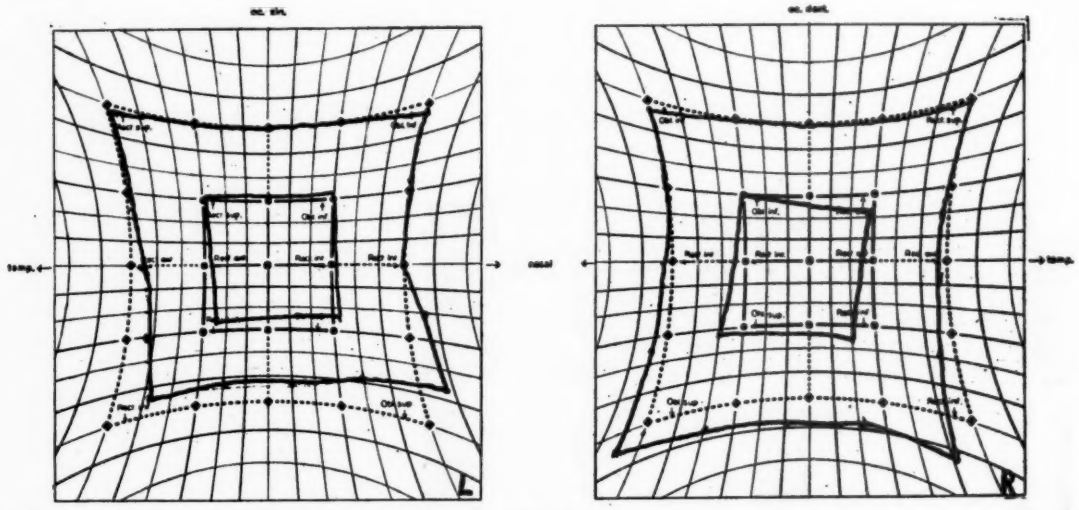

Fig. 13 (Adler). *Case 2.* The fixation fields on the Hess chart, showing a paresis of the left inferior rectus and the left superior oblique and overaction of the right superior oblique and right inferior rectus.

an overaction of the right superior oblique and inferior rectus.

A diagnosis was made of paralysis of the depressor muscles of the left eye due presumably to a hemorrhage in the pons involving the cells of the inferior rectus and superior oblique which lie close together.

Case 3. Mr. J. Van D., aged 34 years, was in an auto accident four weeks prior to examination and was struck on the right side of his head. Since then he has had diplopia when looking to either side below the horizon. He carries his head with chin depressed on chest. The eyes are straight in all positions except on looking down and to the right or left. The strabismus, fixation fields, and diplopia fields suggest a paralysis of both superior oblique muscles, greater on the right side.

Figure 14 shows the diplopia fields taken at the initial examination. All studies were negative. A diagnosis was made of hemorrhage in the pons catching the fourth nerves as they cross one another before emerging from the pons. Five months later the patient was reëxamined and found to have made a complete recovery of the left superior oblique and marked improvement in the right superior oblique. The fixation fields

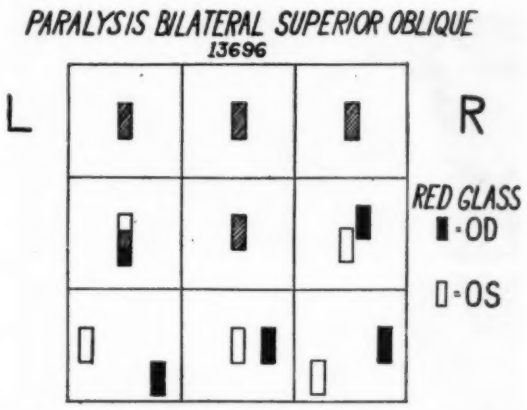

Fig. 14 (Adler). *Case 3.* Diplopia fields indicating bilateral paralysis of the superior obliques. On dextroversion, the right eye assumed fixation, and in levoversion, the left eye.

(fig. 15) failed to reveal any weakness of either superior oblique, but showed a marked overaction of the left inferior rectus. Evidently the right superior oblique had recovered to the extent that it could now move the right eye its full extent down and to the left, but the excessive innervation required to do this caused the yoke muscle, the left inferior rectus, to overact.

Case 4. Mrs. J. D., aged 56 years, had a paralysis of right superior rectus and inferior oblique due to a metastatic tumor in

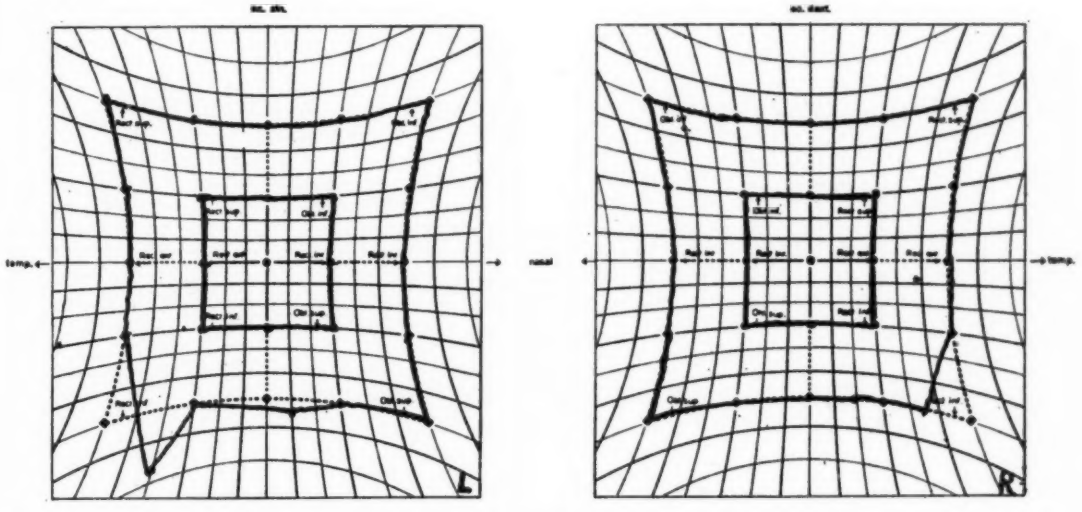

Fig. 15 (Adler). *Case 3.* Fixation fields made five months after first examination. At this time, both of the obliques had recovered, leaving no residual difficulty except overaction of the left inferior rectus.

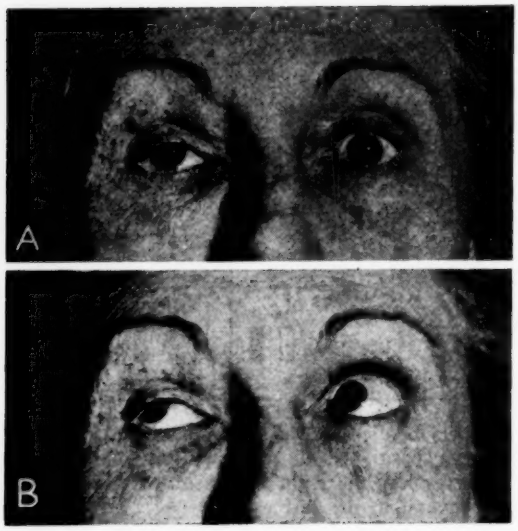

Fig. 16 (Adler). *Case 4.* Ptosis and right hypotropia due to a mass in the right orbit, preventing upward rotation of the right eye. (A) Eyes in the primary position. (B) Looking up and to the right.

the right orbit. For the past six months, this patient has complained of increasing diplopia on looking upward. Examination showed a mass in the right orbit, freely palpable, and an enlarged lymph node above the right clavicle. The right breast, which contained a tumor, was removed along with the enlarged lymph node. The diagnosis of the breast tumor was carcinoma, and the lymph node was diagnosed as a metastatic lesion from this. It was presumed that the mass in the right orbit was also a metastatic lesion which had involved the globe so that upward rotation was impaired. Figure 16 shows the appearance of the patient, and Figure 17 shows the fixation fields, indicating a paralysis of the right superior rectus and the right inferior oblique.

Summary

In a number of cases of paralysis of the vertically acting muscles, the diagnosis is made difficult because two muscles appear to be paralyzed. These cases fall into two groups. (1) Those in which no single lesion could involve both muscles. The muscles seemingly affected are either the superior rectus of one eye together with the superior oblique of the opposite eye, or the inferior rectus of one eye together with the inferior oblique of the opposite eye. In these cases, only one muscle is actually paralyzed, while the seemingly paralyzed muscle in the opposite eye is underacting on the basis of Hering's law. It is evident that the description given in textbooks of paralysis of each of the vertically acting muscles is inadequate

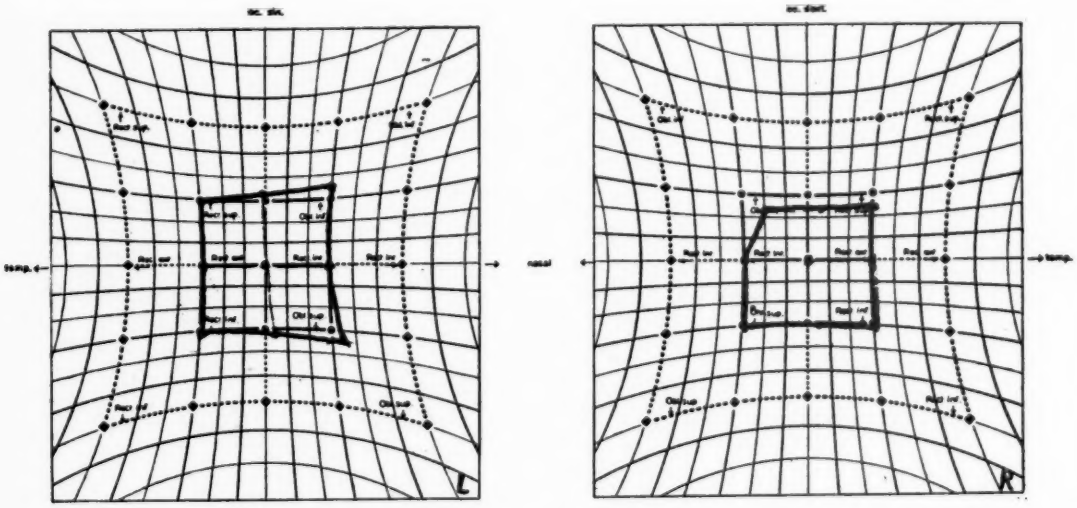

Fig. 17 (Adler). *Case 4.* Fixation fields show paralysis of the right superior rectus and the right inferior oblique and overaction of the left inferior oblique. There is also an overaction of the left superior oblique for which I have no explanation.

in that it only considers the effect the one paralyzed muscle might have on the strabismus and diplopia fields. When the paralyzed eye is habitually used to fix, the effect of a paralysis of one muscle extends to the activities of other muscles in the same and in the opposite eye and this leads to a picture which can be very confusing if the situation is not understood and kept in mind when these cases are analyzed.

In the second group of cases a single lesion involves the elevators or the depressors of one eye or both superior obliques. This is quite understandable on anatomic grounds and should lead to no confusion. The elevators and depressors of one eye can be caught in the orbit by scars and growing tumors, or the nuclei of origin of their nerves may be damaged by small lesions in the pons. The two fourth nerves may be caught as they cross each other before emerging on the posterior face of the brain stem.

313 South 17th Street (3).

THE PROBLEM OF SYMPATHETIC OPHTHALMIA*

THE MONTGOMERY LECTURE

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New York

The term sympathetic ophthalmia designates a disease which is always bilateral. It breaks out first in an eye the external tunic of which has been penetrated, called the exciting eye, and afterwards in the uninjured eye, called the sympathetizing eye. That a disease in one organ should excite an identical disease in a symmetrical organ is, in any event, a most extraordinary phenomenon in human pathology. To remove it still farther from the common order is the fact that the agent that causes it has never with certainty been identified. Hippocrates mentioned, in one brief sentence, that when an eye has been lost from injury the fellow eye often becomes blind. Strange to say this truth received but passing notice through all the centuries until William MacKenzie, in 1835, brought the importance of it to the attention of the modern world. Since then an immense body of writings has dealt with the subject.

The disease is characterized anatomically by the appearance in the pigmented and highly vascular uvea of an infiltration composed of three elements: lymphocytes, epithelioid cells, and giant cells, known as the specific infiltration of sympathetic ophthalmia (fig. 1).

ARTIFICIALLY MADE OPENINGS OF GLOBE

Before going further into the minutiae of the infiltration it would seem timely to speak of the artificially made openings of the globe and of the incarceration of uveal tissue therein, with all of which the problem of sympathetic ophthalmia is inextricably bound up.

ACCIDENTAL OPENINGS

By far the greater number of accidental openings take an anteroposterior direction and many of them are located in the center of the cornea. A small opening in the center is not complicated by a prolapse of the iris and hence is considered to be less dangerous than one in the periphery into which the iris would more readily fall.

A prolapse of the iris, large or small, in a corneal wound is particularly hazardous

* Delivered before the Irish Ophthalmological Society, at Trinity College, Dublin, Ireland, May 12, 1947.

because it lies naked on the cornea which, when the lids are apart, is the most exposed field of the globe. Unless the iris is excised the wound remains open a long time and the prolapse can only disappear by necrosis.

Singularly, an exposure of the iris as a whole after a most extensive perforating wounds of the sclera over the ciliary body are more dangerous than analogous wounds elsewhere because of the greater tendency of the uveal tract to prolapse. Particularly disastrous are ruptures at the limbus because here the root of the iris, either alone or with the ciliary processes, is most likely to become

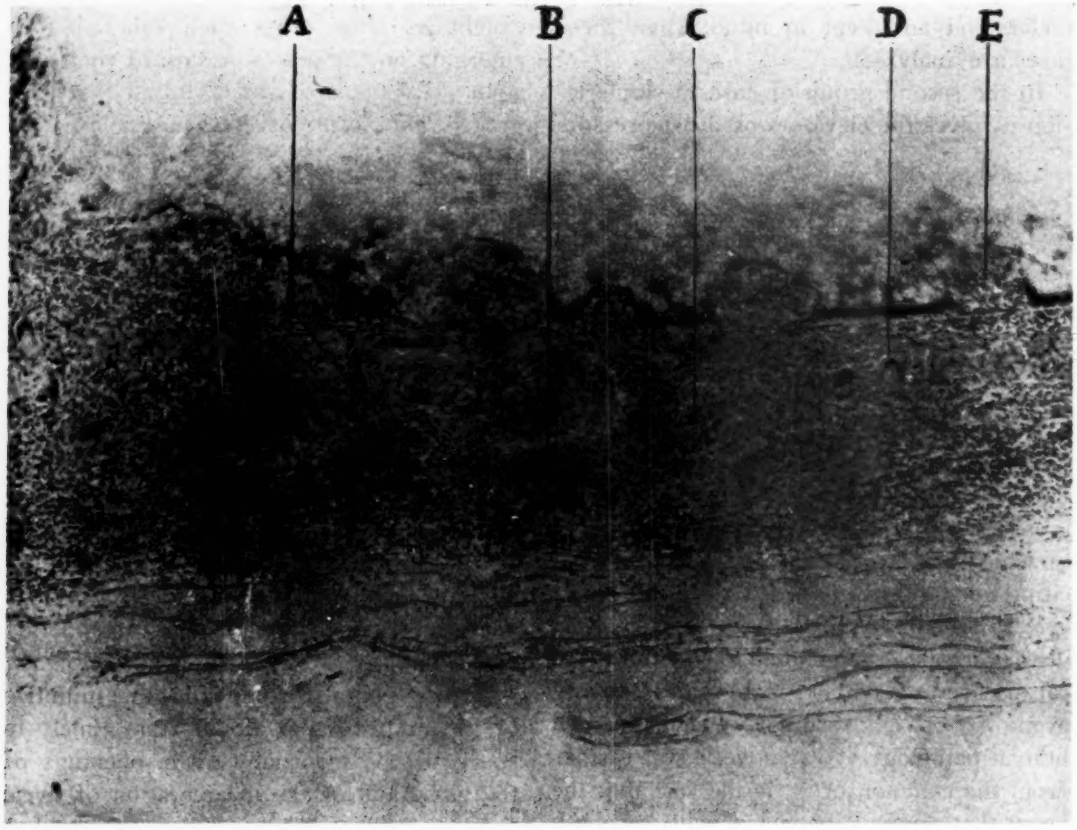

Fig. 1 (Samuels). In this specimen from the choroid, the entire pathologic anatomy of sympathetic ophthalmia is shown. (A) Lamina vitrea. (B) Lymphocytes. (C) Epithelioid cells. (D) Giant cells. (E) Galen's foci.

serpiginous ulcer is seldom followed by sympathetic ophthalmia. The iris is not constricted or strangulated as in a small opening and, as the iris and the limbus are heavily inflamed, there is soon produced a fibrinous exudate which seals off the exposed area in the first step of what will in time become a staphyloma of the cornea.

The regions of the ciliary body is appropriately called the "dangerous zone." Punctured, incised, contused, and lacerated incarcerated. whether injured or not. In general, the larger the perforation, the longer it remains open; and the more extensive the uveal prolapse, just so much greater is the hazard.

A few cases of sympathetic ophthalmia are reported as having been brought on by a contusion over the ciliary body without rupture of the sclera. Probably in some of these cases the blow produced ruptures in the conjunctiva and sclera too minute to be seen.

Surgical openings

Surgical openings, except those made for corneal transplantation, generally take a frontal direction parallel to the anterior surface of the iris. The surgery of today, instead of lessening the possibilities of sympathetic ophthalmia, has vastly increased them. Formerly the field of intraocular operations was restricted to the periphery of the cornea and the limbus. It now embraces every zone of the surface of the eyeball from the center of the cornea to the neighborhood of the optic nerve. While no incision is ever made directly over the ciliary body, yet diathermy here is one of the methods employed for glaucoma.

Among the earlier operative procedures that had to be abandoned is iridodesis which Critchett devised in 1858. He sought to obviate the large opening of an optical iridectomy and the loss of pupillary reaction by drawing the periphery of the iris into a small incision in the cornea above, leaving the pupillary border within the chamber. A thread was tied around the protruding iris to prevent its slipping back. No thought seems to have been given to the danger of the procedure until Graefe, in 1863, published a case of bilateral inflammation and blindness following its used, which he believed had been caused by traction on the incarcerated iris from within the globe but which must have been due to sympathetic ophthalmia.

In recent years Key's method for the repair of iridodialysis by suturing the root of the iris to the periphery of the cornea was soon abandoned as unsafe after the report of a case of sympathetic ophthalmia. Evisceration of the contents of the globe is not considered to be free of danger for it is not possible to scrape off the uveal tissue that lines the walls of the emissaria.

As regards operations for the removal of cataract, the flap incision at the periphery of the cornea is considered safest from the standpoint of sympathetic ophthalmia. Graefe's linear extraction, in which the incision lies back of the limbus where a conjunctival flap is not easily obtained, fell into disrepute after several cases of sympathetic ophthalmia were reported. An idea prevails that the intracapsular operation is less dangerous than the extracapsular. It is true that the occurrence of lens capsule and lens matter in the wound, with consequent delay in healing, is obviated by the intracapsular method but when an actual prolapse of the uvea has happened one method must be as dangerous as the other. I recently examined a globe in which, after an intracapsular operation, there was a large prolapse of the iris and ciliary processes. There was no purulent infection. The specific infiltration was extensive and in pure form. The fellow eye became violently inflamed six weeks after the operation and was blind almost from the start.

Sympathetic ophthalmia may occur after operations for glaucoma whether the opening is small, as in a trephine operation, or large, as in a modified Lagrange. All parts of a globe affected with long-standing glaucoma are more or less degenerated and inflamed so that a fistulous opening, with or without prolapse of the iris, is often not possible. The very low tension that sometimes sets in and which may be thought to be due to filtration may, in fact, represent a postoperative iridocyclitis with fine deposits on Descemet's membrane. Such a globe is at the threshold of atrophy and is as dangerous for sympathetic ophthalmia as if it had never been glaucomatous. It is borne out by experience that as long as an eye remains hard after an operation the probability of sympathetic ophthalmia is remote.

The possibility of sympathetic ophthalmia following operations for detachment of the retina is practically never considered in spite of the numerous openings that are made into the sclera and choroid. These two structures are membranous and lie in close apposition so that there is no reason for the choroid to prolapse. Rather it shrinks from the wound

by its own elasticity and, moreover, the openings are immediately closed by tissues at the end of the operation.

In point of surgical procedures contributing to sympathetic ophthalmia, cataract extration heads the list and next come operations for glaucoma. They are all near the "dangerous zone," and cataract operations require the largest of all incisions. There is no standard operation in ocular surgery that has not had marked against it a case of sympathetic ophthalmia or infection. That the occurrence of sympathetic ophthalmia has not kept pace with the ever-increasing number and complexity of operations is certainly due to good surgery and thorough antisepsis. A factor not to be overlooked in the causation of postoperative sympathetic ophthalmia is a tendency on the part of a surgeon to delay too long the enucleation of an eye that has not healed properly. In a hospital a case or two of sympathetic ophthalmia may occur and then be followed by an interval of freedom which lasts as long as the memory of the lesson taught by this experience remains fresh. That the danger of sympathetic ophthalmia was fully realized by surgeons in World War II is evident from the statistics of the Army Institute of Pathology in Washington. Until recently there had been received only 16 globes that had developed sympathetic ophthalmia following training and combat injuries.

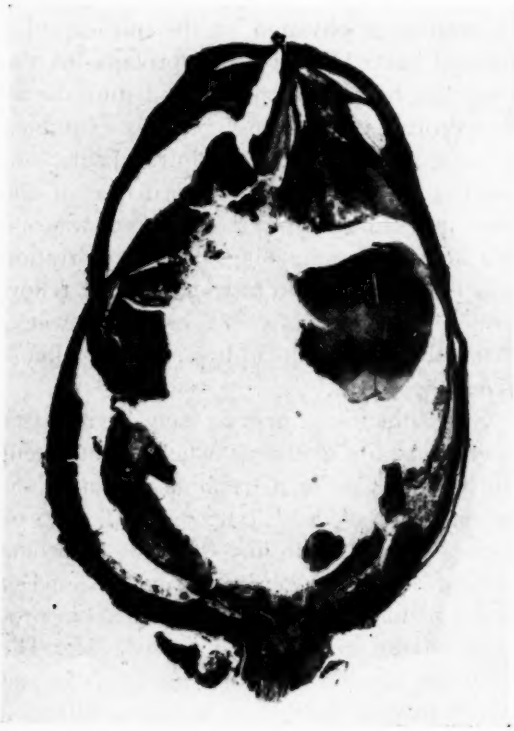

Fig. 2 (Samuels). Open panophthalmitis with purulent destruction of papilla. Sclera is intact.

Role played by the healing process of a perforation

There is nothing remarkable about the scar tissue that heals a perforation and in so doing distorts the globe and causes it to become soft. One cannot say that the fellow eye will become inflamed but it may. In the cases in which this occurs two separate pathologic conditions are found in the injured eye: (1) the consequences of the injury itself and, (2), without discernible cause, the specific infiltration in the uvea.

Complications in the healing process

1. *Endophthalmitis Septica.* Pyogenic bacteria may be introduced into the vitreous body by the instrument or enter later. Here they multiply and elaborate toxins which set up an exudative process from the blood vessels in the adjoining retina, papilla, and ciliary body. The pus cells, being highly motile, travel inward toward the bacteria to form an abscess of the vitreous. The iris is little affected because it is bound down to the lens capsule and, where it is exposed in the periphery, the pigment epithelium and the dilatator muscle protect the stroma from the toxins, which accounts for the aqueous and cornea remaining clear. The bacteria soon die and the pus cells become necrotic. A cyclitic membrane detaches the retina. The essential thing is that the choroid be protected from toxins by the retina and later also by the subretinal fluid. When such an

eye has caused sympathetic ophthalmia there is found in the choroid, entirely independent of the damage caused by injury or infection, the specific infiltration. Whatever the causative agent of sympathetic ophthalmia, the pus-producing bacteria do not always destroy it, if they ever do, for it is estimated that from 2 to 13 percent of all cases of sympathetic ophthalmia have originated in globes that had suffered from posttraumatic endophthalmitis septica.

2. *Septic Panophthalmitis.* In septic panophthalmitis, virulent bacteria in the vitreous destroy not only the retina but also the choroid. The amount of the destruction depends largely on the state of the opening (fig. 2). If it remains open—open panophthalmitis—there is less damage to the uvea because the abscess can discharge itself through the preformed opening. If the wound is closed—closed panophthalmitis—the destruction of the uvea must be great before the abscess can break through the sclera, usually at the equator, and discharge itself into the orbital tissue (fig. 3). In either case the eye shrinks to a mere stump—phthisis bulbi. Nevertheless, a minute amount of uveal tissue is almost certain to be spared. The incidence of sympathetic ophthalmia after panophthalmitis I estimate to be about 3 percent.

3. *Foreign Bodies.* It is computed that particles of steel constitute 98 percent of all intraocular foreign bodies found in civilian life.* The size of such particles varies from 0.5 to 6 or 8 mm. in diameter. In most instances the point of entrance is through the cornea. Most of these foreign bodies are extracted with good results, particularly when the anterior route is used. Sympathetic ophthalmia in these cases is exceedingly rare. The penetrating wound is very small and the tissues touched by the foreign body tend to fall inward in its pathway.

Every foreign body that remains within the globe sooner or later surrounds itself with a bed of connective tissue which may be so large as to occupy half of the vitreous cavity. Eventually the bed tends to break down and discharge poisonous substances and extrude the foreign body into the cavities of the globe or outside of it. The presence of a foreign body, even while still confined in its bed, causes the eye to be more or less sensitive, and may excite irritation of the other eye, all of which may go on for years. If such an eye has been the source of sympathetic ophthalmia, it will show, aside from the consequences of the wound and of the foreign body, the specific infiltration in the uvea, as if no foreign body existed. When, concurrent with the foreign body, bacteria are introduced, it is the bacteria that cause the first inflammatory reaction and the presence of the foreign body is of no immediate consequence. Acting as a

Fig. 3 (Samuels). Closed panophthalmitis. The sclera and orbital tissues are blended in necrosis. (C) Cornea. (O) Optic nerve.

* Gulliver, F. O.: Particles of steel within the globe of the eye. Arch. Ophth., **28**:896-903, 1942.

foreign body in atrophic eyes of long standing and not of itself dangerous for sympathetic ophthalmia is a plate of bone which forms out of a connective-tissue membrane on the internal surface of the choroid or within its stroma.

Stage 1. Isolated nodules of lymphocytes appear in and around the walls of the larger veins of the choroid.

Stage 2. In the midst of the nodules of lymphocytes appear groups of large oblong cells with faintly staining nuclei and poorly

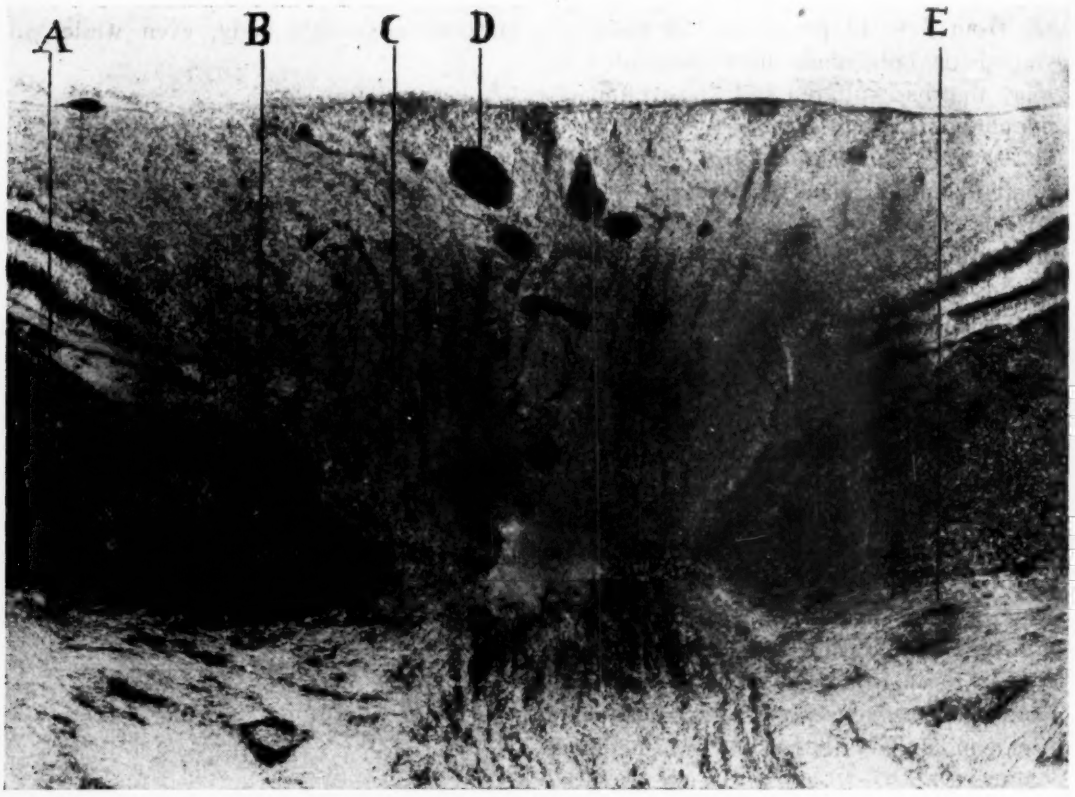

Fig. 4 (Samuels). Circumpapillary infiltration of choroid. (A) Pigment epithelium and choriocapillaris intact. (B) Low detachment of retina. (C) Papilledema. (D) Retinal perivasculitis. (E) Invasion of emissaria.

Minute anatomy of the specific infiltration of sympathetic ophthalmia

The exciting eye

In making a pathologic differentiation of sympathetic ophthalmia in the exciting eye, the posterior part of the choroid is chosen because the uvea is here the least damaged by the injury, and it is here that the infiltration is generally the more typically developed, probably because of a greater thickness of the tissue and a richer blood supply (fig. 4). The infiltration takes place in the following manner.

defined borders, known as epithelioid cells because they resemble the same cells in tuberculosis. They are believed to originate in the endothelium of the walls of the blood vessels which by this time have disappeared.

Stage 3. Later a number of epithelioid cells may merge to form a giant cell. This third element is not necessary. A typical nodule consists of lymphocytes and epithelioid cells.

In time the nodules coalesce and diffusely replace the vascular structure of the choroid, forming a layer of three or more times the normal thickness. No matter how heavy the

infiltration is, the overlying choriocapillaris remains singularly free. It may be because this layer is not composed of typical uveal tissue but is made up of a network of capillary tubes in a nonpigmented almost homogeneous stroma. In disseminated chorioretinitis, the capillary layer is always destroyed. In sympathetic ophthalmia, the pigment epithelium and the retina are not affected. Occasionally small mounds of proliferated pigmented cells develop on the internal surface of the choroid—Galen's foci—which are of no importance (fig. 1).

Externally, the suprachoroidal lamellae become infiltrated but epithelioid cells are not to be found here, at least in the first stage, because the lamellae contain no blood vessels. The infiltration travels outwardly along the uveal tissue that lines the emissaria so that typical nodules may appear on the external surface of the sclera. Indeed, the stroma of the sclera may become so invaded that the inflammation takes on the nature of a chorioscleritis. Typical nodules have been encountered at a considerable distance from the sclera among the bundles of the inferior oblique muscle (fig. 5). Not infrequently the infiltration makes its way through the emissaria that surround the nerve head and travels into the pial sheath. As a rarity nodules are seen along the walls of the retinal blood vessels in the cribriform plate. It is to be emphasized that, strictly speaking, sympathetic ophthalmia is a disease that is not confined solely to the inner eye.

In the ciliary body the nodules coalesce to form plates in the vascular layer. Here the pigment layer may be destroyed, but the nonpigmented epithelial layer is always preserved just as is the choriocapillaris. Giant cells are more often to be found in the ciliary body and when pigmented they are probably derived from the chromatophores.

In the iris, the infiltration may assume the size and shape of a tumor filling out the entire anterior chamber (fig. 6). No matter how excessive the infiltration is, it leaves the anterior limiting layer of the iris free. On the other hand, posteriorly, the pigment epithelium is broken through very early in the process and nodules of lymphocytes and epithelial cells expand along the surface of the lens. When the root of the iris is heavily infiltrated and thickened, the infiltration passes into the anterior emissaria, and files of lymphocytes, penetrating between the limbus

Fig. 5 (Samuels). Sharply defined sympathetic nodule among the fibers of the inferior oblique muscle.

and sclera, actually destroy many of the bundles so that the corneoscleral margin may be the most severely inflamed part of the margin. One of my specimens reveals a typical nodule in Schlemm's canal.

The disease reaches its anatomic peak when the iris, the ciliary body, and the choroid are all infiltrated. The infiltration may be so exuberant as to almost fill the globe within the brief space of 5 or 6 weeks. The stages of disintegration take a long time, often years. First the giant cells disappear and then the epithelioid cells. At last the entire infiltration is replaced by a membrane of dense uncharacteristic connective tissue.

The sympathizing eye

A very short time after the infiltration forms in the injured eye it appears in the

fellow eye. Only about a dozen of the sympathizing eyes have come to histologic examination because there is no reason for enucleating one unless the patient dies or the eye causes so much pain that he prefers to have it out. In these few cases the same kind of infiltration and the same distribution in the uveal tract are found as in the injured eye. Most often it is the most anterior part of the uveal tract that suffers first. The picture is a pure one, uncomplicated by the consequence of traumatism or infection.

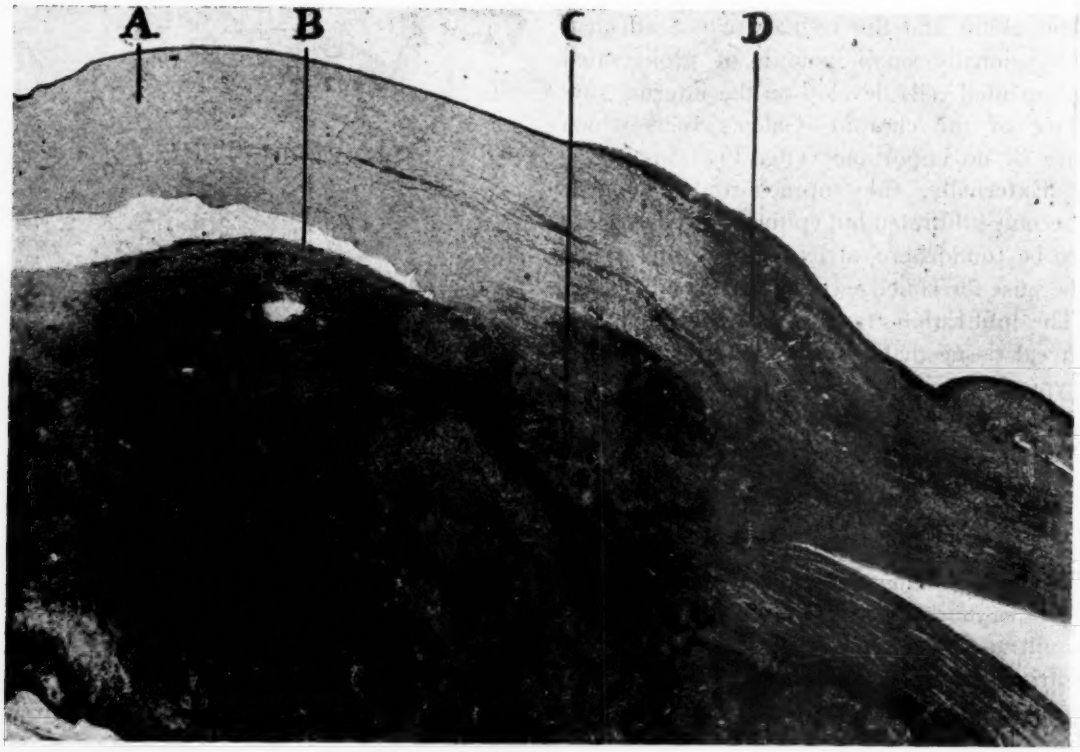

Fig. 6 (Samuels). Tumorlike infiltration of the iris and ciliary body. (A) Normal cornea. (B) Sharply defined anterior limiting layer of the iris. (C) Giant cells in island of epithelioid cells. (D) Limbus thinned and dehiscent.

Occurrence in different countries

Sympathetic ophthalmia is thought to occur with about the same frequency in the Americas, Europe, and China.* However, in India, notwithstanding the many thousands of cataract extractions that are performed annually, it is said to be practically unknown. Either the people of that country possess an exceptional degree of resistance to the disease or the agent that causes it does not exist there.

* Fuchs, A.: Ueber sympathisierende und sympathische Ophthalmie. Med. Welt., 15:313 (Mar.) 1941.

Anatomic similarity and difference between sympathetic ophthalmia and tuberculosis

Points in common

Sympathetic ophthalmia and tuberculosis are composed of the same histologic elements: lymphocytes, epitheloid cells, and giant cells. The two diseases are alike when it comes to two of their chief characteristics; namely, proneness to recurrence and exacerbation. As regards the bilateral aspect, it cannot be sympathetic ophthalmia unless both eyes are involved. However, tuber-

culosis has a well-known tendency to attack both eyes simultaneously.

Points of difference

In sympathetic ophthalmia the nodules are located in the outermost layers of the choroid; in tuberculosis in the innermost layers. A giant cell in each disease contains many nuclei but the arrangement is different. In sympathetic ophthalmia the nuclei are formed by an irregular fusion of epithelioid cells. In tuberculosis the nuclei are apt to be disposed in the form of a ring—Langhan's type—being considered the product of a proliferation of the endothelium of a capillary. Caseation takes place almost from the beginning in tuberculosis; rarely in sympathetic ophthalmia, and then in the latest stage. The necrosis that is sometimes seen in sympathetic ophthalmia is not to be mistaken for caseation. Over a tuberculous nodule, the pigment epithelium of the choroid is destroyed as in miliary tuberculosis; over a sympathetic nodule, it is preserved. Tuberculosis tends to be localized in one part of the uvea. For example, when it starts in the iris or ciliary body it remains there indefinitely. Sympathetic ophthalmia spreads rapidly to all parts.

In tuberculosis of the iris, the nodules are located in the posterior layers, and the anterior limiting layer is spared. In sympathetic ophthalmia, the nodules pierce the pigment epithelium and expand against the capsule of the lens and proliferate into the circumlental space. They may develop while the pupil is widely dilated and cause the iris to be plastered to the lens in this shape, in contrast to ordinary plastic iritis in which there are no adhesions as long as the pupil is wide. In tuberculosis of the iris, the pupil reacts over a long period. In sympathetic ophthalmia, it is almost immediately fixed. In sympathetic ophthalmia, the normal color of the iris is less altered than in tuberculosis where it assumes a dull, grayish hue from the destruction of the chromatophores.

In the ciliary body, the nodules of sympathetic ophthalmia coalesce and form plates within the vascular layer and are separated from the vitreous body by the intact nonpigmented epithelial layer. In tuberculosis, the nodules destroy both epithelial layers of the ciliary body and lie free on the surface or suspended in the zonular fibers.

In sympathetic ophthalmia, the retina is practically never involved. In tuberculosis, secondary nodules in the retina are by no means rare.

In sympathetic ophthalmia, nodules in the emissaria appear almost at the same time that they do in the choroid. A careful search should always be made for early infiltration in the emissaria. In tuberculosis, involvement of the emissaria comes much later.

The most important anatomic difference between sympathetic ophthalmia and tuberculosis lies in the behavior of the lesion of each toward the adjoining tissues. Tuberculous infiltration has a tendency to invade other tissues. If it starts in the iris it will gradually fill the anterior chamber, and when it touches the cornea and sclera it produces in them an excavation of the same size and shape as the tuberculous tumor itself and in time destroys them. Such malignancy the sympathetic lesion does not possess. It remains in the uveal tract and destroys neither the retina on one side nor the sclera on the other.

Clinical signs of sympathetic ophthalmia

1. Sympathetic irritation

While the pathologic signs in sympathetic ophthalmia are almost unfailingly characteristic, such is not the case with the clinical symptoms. Thus the photophobia, the tearing, and the failing accommodation of sympathetic ophthalmia may also be seen in the second eye when there is no more than a foreign body embedded under the epithelium of the first eye. Actually, the only sure way to exclude the possibility of inflammation in the second eye, when it is irritated, is to make an examination of the media with the

slitlamp and ophthalmoscope. Even when no evidence of inflammation is found in the second eye, mere irritation is not to be taken lightly but rather as a warning of an impending outbreak of sympathetic ophthalmia. If it be mere irritation, this will disappear in a few days after the enucleation of the injured eye.

2. True sympathetic ophthalmia

The inflammation begins in the uninjured eye slowly and at first without pericorneal injection or pain. Disturbance of vision is often the first symptom, which probably manifests itself after nodules have formed in the uvea. In an early case, fine, grayish precipitations are seen on the posterior surface of the cornea. In attempting to dilate the pupil, adhesions are found, and in the vitreous, numerous fine opacities will be visible. Sometimes, at the very beginning, the media are clear enough to permit observation of an edema of the papilla, with cloudiness of the neighboring retina—a picture that is almost never seen in other forms of uveitis. Small yellowish patches in the choroid, about the size of a druse and almost as sharply defined, are very characteristic. They often disappear without leaving a sign. Anatomically these are probably isolated nodules of lymphocytes and epithelioid cells lying deep in the choroid. The infiltration into the emissaria, with scleritis, is probably the cause of the deep-seated pain that is one of the most distressing symptoms of the disease.

The state of the pupillary border, even before the loupe and lens came into general use, was considered of the greatest importance in arriving at a differential diagnosis. In the mildest form of iritis—iritis serosa—the pupil is free. The severer form —plastic iritis—is prone to cause incomplete adhesions which, as a rule, are confined to the pupillary zone. On the other hand, in genuine sympathetic iritis, sometimes called iritis maligna, the entire posterior surface of the iris is very soon agglutinated to the capsule of the lens. Occasionally grayish nodules break out at the pupillary border and expand on the lens capsule. This is a finding that is considered the most significant clinical sign of sympathetic ophthalmia in the anterior chamber. The iris may bulge forward, not from a damming back of the aqueous but from an increase of thickness as a result of the infiltration. The manifestation of iritis maligna marks the arrival of the disease at the culminating peak of its clinical severity.

Pathogenesis of sympathetic ophthalmia

1. Various theories

For over a hundred years many conjectures have been advanced as to the pathway by which the lesion in the injured eye sets up an identical lesion in its fellow. The infiltration in the sheaths of the injured eye does not travel via the chiasma since it is not found in the sheaths of the fellow eye. Transmission by way of the optic-nerve fibers cannot explain the infiltration in those cases in which it makes its first appearance as far forward as the iris of the fellow eye. The idea that it is transmitted through continuity of the ciliary nerves fell into oblivion because no connection between the two systems has been found. The old guess that the disease is carried to the other eye in the blood stream by a circuitous route through the vessels at the base of the brain approaches more nearly the present conceptions.

2. The allergic theory

In 1909, Elschnig, in Prague, published the theory that portions of the uveal pigment from the injured eye enter the blood stream and, acting as foreign matter, set up an anaphylactic reaction in the uvea of the fellow eye. Woods, in Baltimore, has carefully developed this theory and ascertained that, in its immunologic reactions, uveal pigment has the power of producing the formation of antibodies. The bleaching of the eyebrows that is occasionally seen in sympathetic

ophthalmia seems to speak for some disturbance of the pigment metabolism.

3. THE INFECTIOUS THEORY

a. The Tuberculosis Theory. In the Meller school in Vienna, in the years prior to 1940, tubercle bacilli were demonstrated in 20 percent of the eyes removed because of posttraumatic iridocyclitis. In one case of sympathetic ophthalmia which neither clinically nor histologically was entirely typical, Meller succeeded in cultivating tubercle bacilli. He concluded that sympathetic ophthalmia is of tuberculous origin and that between sympathetic ophthalmia and tuberculosis there is no essential difference, since they are both caused by the same microörganism.

b. The Virus Theory. In a microscopic study of the pathology of sympathetic ophthalmia, embracing some 120 globes and extending over many years, I have occasionally encountered an infiltration which was confined to the site of the opening. If the uvea had prolapsed then, the infiltration was both without and within the globes (fig. 7). More often the infiltration, while present elsewhere, was overwhelmingly heaviest at the site of the wound. Often the infiltration at the site of the wound was about equal to that in the choroid. In a few globes the infiltration here was less than

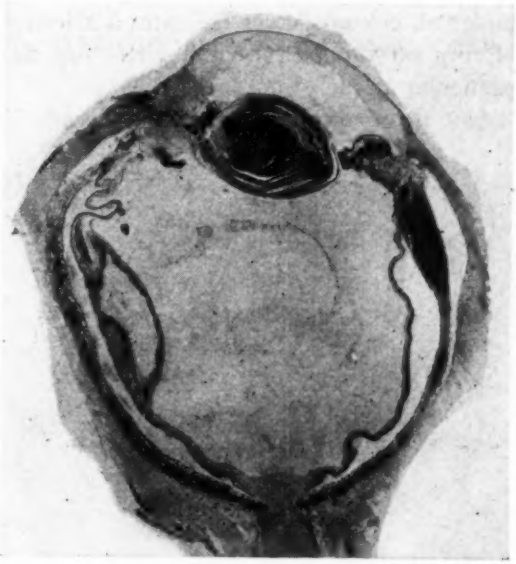

Fig. 8 (Samuels). Absence of infiltration at depressed scar of wound. Typical nodules in choroid becoming coalescent. Pial sheath of optic nerve infiltrated and also emissaria in sclera.

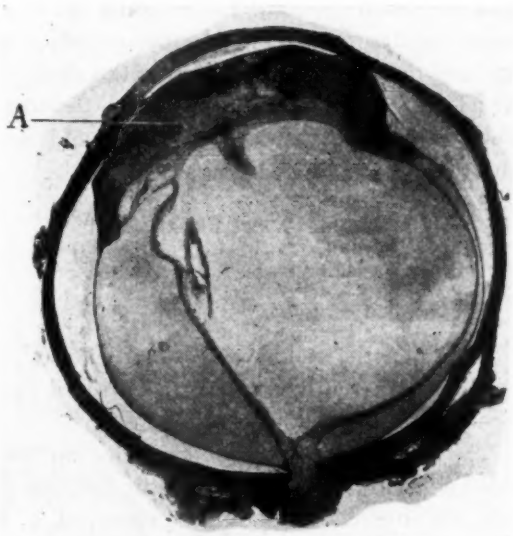

Fig. 7 (Samuels). Massive specific infiltration confined to the anterior segment of the globe at the site of the wound. (A) Cicatricial tissue caused by attempted iridectomy.

that elsewhere. There were still fewer globes in which it was absent at the site of the wound. The meagerness or absence of infiltration at the site of the wound could be explained by the circumstance that the uveal tissue in this location was too much damaged by the primary injury to react or else that it had been excised (fig. 8).

It is recalled that in the eye, as elsewhere in the body, an exogenous infection may occur without a primary lesion; that is, without a local accumulation of cells. It is also possible for a primary lesion to be so small as to pass unnoticed. The fact that primary lesions in the uvea at the site of the opening do occur leads me to accept the theory that sympathetic ophthalmia is a disease produced by a virus which has the perforating wound as its point of entrance. Here it lodges in the uvea and produces an

irritation which results in the specific infiltration of sympathetic ophthalmia. It spreads from this point to other parts of the uvea of the same eye and thence through the blood stream to the uvea of the other eye. That the infiltration confines itself to the uvea under all circumstances indicates a selective affinity on the part of the virus for this particular tissue.

One theory is that the virus is already in the blood and only after the uvea is traumatized does it lodge and multiply there and take on its selective affinity.

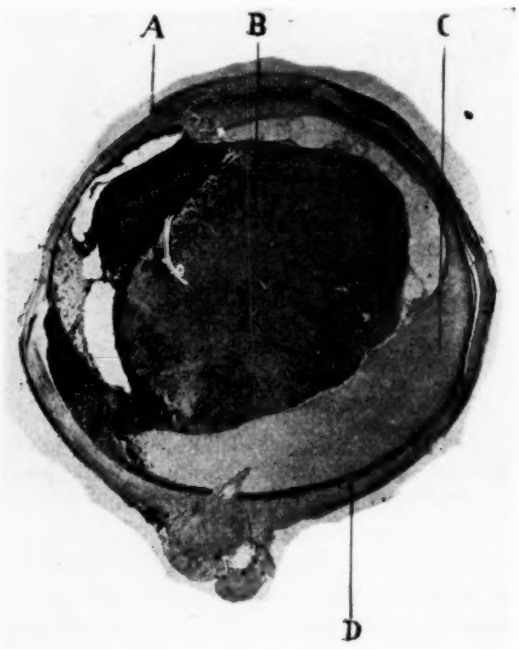

Fig. 9 (Samuels). Malignant melanoma of choroid and sympathetic ophthalmia. (A) Site of the wound. (B) Tumor with highly pigmented area next to wound. (C) Subretinal fluid. (D) Specific infiltration of sympathetic ophthalmia.

In further support of the theory of primary infection is the fact that, in the iris, the infiltration always appears to be older than in the choroid. Many times in the course of an observation, I have been able to trace the progress of the infiltration from the iris and ciliary body to the choroid and thence to the emissaria and external surface of the sclera, with as much certainty as tuberculous foci can be traced from the ciliary body to the choroid and retina.

In those cases in which sympathetic ophthalmia breaks out long after the injury, it is assumed that the virus has lain dormant in the tissues as bacteria may do in a healed alveolar abscess. Hence the infiltration in the late outbreaks has, as a rule, the appearance of being of recent origin.

A very few cases, some of them doubtful, have been reported in which a lesion similar to that of sympathetic ophthalmia is said to have broken out in one eye in connection with a malignant melanoma in the other. However, this can detract but little from the fact, so long established clinically and pathologically, that sympathetic ophthalmia is overwhelmingly associated with unnatural openings of the globe. I have recently examined a globe which exhibited both a malignant melanoma of the choroid and the specific infiltration of the choroid characteristic of sympathetic ophthalmia (fig. 9). The eye had been operated upon for absolute glaucoma and cataract. Two weeks after the operation the fellow eye became inflamed and the vision reduced. The exciting eye was immediately removed. Microscopically, it showed the specific infiltration in the choroid at a distance from the tumor. It is reasonable to suppose that the operation and not the tumor was the sole cause.

Prognosis and Treatment

I. Surgical treatment

a. Time to Enucleate

1. When the fellow eye is irritable, even if it be apparently normal, the injured eye should be removed.

2. At the discovery of deposits on the posterior surface of the cornea of the fellow eye, the injured eye should be removed.

3. In all cases in which the wound is retracted, especially if it contains uveal tissue and the eyeball is soft and tender to touch; when the vision is failing; when, in short,

there is no hope that the organ will ever again be serviceable, the time to enucleate has arrived.

Sympathetic ophthalmia has been known to set in within 48 hours after the injury, but it may not happen until years have elapsed. It is at once the gravest and the most unpredictable of all ocular diseases. The most hazardous period is during the first 2 or 3 months.

4. A globe with endophthalmitis is removed with safety at any time because the infection is confined within the fibrous tunic.

b. When Not to Enucleate

1. When the wound heals properly, the tension is good, some sight is retained, and the fellow eye shows no irritation, it is safe to wait and watch.

2. When the injured eye still has some vision after the fellow eye has become severely inflamed, the rule is to retain the injured eye, for in the end it may be the one eye that retains any sight.

3. When both eyes are violently inflamed, the enucleation of the injured eye can serve no purpose.

4. As regards panophthalmitis, Graefe reported the loss of two patients from meningitis after the enucleation of a globe with flagrant panophthalmitis. Since that time, it has been traditional in Germany and Austria never to excise such a globe until the inflammation has subsided.

Sympathetic ophthalmia has occurred during the active stage of panophthalmitis but so rarely as to justify delay. Occasionally, after the promptest removal of an injured eye the remaining one becomes inflamed. This may happen up to 20 days, which is the longest time on record. Such a retarded attack was formerly believed to have been excited by the removal of the injured eye. In these delayed cases, the virus was probably on the way but had not reached its destination at the time of the removal of the globe.

In the matter of enucleation, it is well to excise a long strip of the optic nerve and with it the surrounding tissues, not omitting to leave a long strip of the inferior oblique muscle with the globe. Radium treatment to the socket is suggested (fig. 10).

c. Complicating Secondary Glaucoma

As regards the secondary glaucoma which so frequently complicates the disease in the

Fig. 10 (Samuels). Section shows buphthalmic eye six years after injury. Optic nerve excised within scleral canal. Heavy episcleritis. Probably much sympathetic material remained in the orbit.

sympathizing eye, the surgical field is limited strictly to the clear cornea. No greater mistake can be made than to attempt to perform an iridectomy, for the iris as such no longer exists but is replaced by granulation tissue.

Paracentesis is the sole operation permissible. The incision may be opened the following day in order to improve the general condition by the evacuation of a cloudy and toxic aqueous. This procedure may be repeated many times. The highly swollen iris with its intact anterior surface—iritis maligna—is sometimes mistaken for iris bombé which leads to an attempt to reëstablish the communication between the two

chambers by transfixion or, worse still, by iridectomy.

d. Complicating Cataract

Concerning the complicating cataract that develops in time in the sympathizing eye, the dictum is not to attempt its removal until it is certain there has been no sign of inflammation for many months, and even then the indication should be nothing less than almost total blindness. The best result is promised by opening the occluded pupil and extracting the lens matter through it. Even by this method, the pupil is apt to close over from shrinkage of the surrounding membrane.

II. Medicinal treatment

Miotics would tend to increase the central synechia, and mydriatics would be harmful on account of the tendency to glaucoma—if, indeed, these solutions can have the least effect on iritis maligna.

Starting with the salicylates and mercury in the early days, down through salvarsan and tuberculin to the sulfa preparations and penicillin, not omitting fever therapy, medicinal remedies of many kinds have been tried. A complete list would form a catalogue of the passing moods in therapeutics during many decades. From almost every remedy there has come a report of a cure, after the removal of the injured eye. No doubt a number of these cases have been reported far too soon. The sight of an eye may improve immediately after the removal of the exciting eye and then, within a month or two, there may be a return of the inflammation followed by one attack after another through years until blindness ensues. It is to be remembered that cases of spontaneous cure are on record in which the removal of the injured eye was refused.

In evaluating the efficacy of any particular medicinal treatment, it is necessary to know in what exact pathologic stage of the disease it was begun. Treatment is conceivably helpful in the first stage before too many nodules have infiltrated the choroid and invaded the sclera, but in the second and third stages, it is difficult to understand how any remedy can affect the infiltration which by this time must have replaced the normal uvea and can only end in a fibrous membrane.

57 West 57th Street (19).

Historical Miniature

Ibn Sina calls attention to the possibility of ablation of prolapsed iris but advises against it in the following words: "Sometimes there is an outpouring of material which is also directed to the other eye." His commentator, Gentilis de Fuliginio, (died 1348 in Perugia) adds: "Quia oculi sunt alligati in cruciatione nervorum." Here we have the oldest suggestion of sympathetic inflammation of the eyes and even a theory of it.

Hirschberg in *Graefe-Saemisch Handbuch*, v. 13.

A SIMPLE PTOSIS OPERATION: UTILIZATION OF THE FRONTALIS BY MEANS OF A SINGLE RHOMBOID-SHAPED SUTURE*

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Each of the many ptosis operations in current usage can be classified into one of three general types: (1) Utilization of the paretic levator, (2) utilization of the superior rectus, or (3) utilization of the occipitofrontalis. It is generally conceded that no single type of ptosis operation will serve for the best correction of all cases of ptosis. This report describes a simple yet effective technique of utilizing the frontalis. The results of 31 such operations, performed on 23 patients, are analyzed.

Techniques for utilization of the frontalis are so legion as to obviate the necessity of a detailed description of each. Those in more common usage are Machek's attachment of the lid to the frontalis by means of two strips of dermis, Reese's attachment by means of orbicularis fibers, and Derby's attachment by means of a fascia lata sling. Kitlowski[1] has modified the fascia lata sling operation in that he places a strip of fascia lata in the shape of a rhomboid between the lid and the frontalis. The technique we have used is a modification of Kitlowski's in that we have used a permanently buried suture instead of fascia lata, have avoided dissection in the lid, and have placed the suture in such a position that a satisfactory lid fold has resulted.

TECHNIQUE OF OPERATION

Two small stab incisions are made at the upper border of the brow, one 5 mm. from its nasal termination and the other approximately 3 cm. lateral to the first. Each of these incisions goes down to periosteum. Two tiny incisions are made through the skin, 2 mm. above the upper lid margin and about 2 cm. apart, placed symmetrically so that they lie about 7 mm. from the nasal and lateral canthi respectively (fig. 1). A braided white-silk suture (size from 2-0 to No. 2) on a No. 5 three-eighths curve surgical cutting needle is inserted through the upper nasal of these four tiny incisions, through the fascial ter-

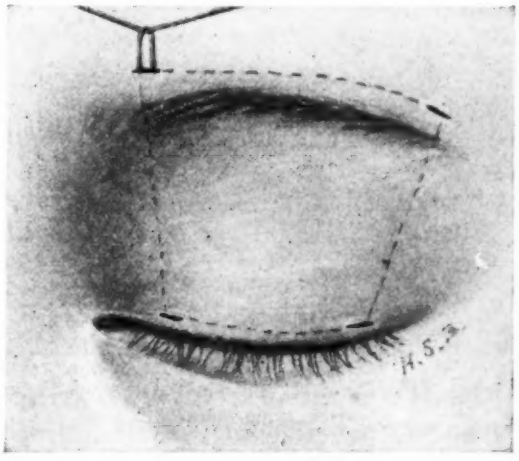

Fig. 1 (Friedenwald and Guyton). Incisions and path of suture.

mination of the frontalis above the brow (just over the periosteum of the frontal bone), and out through the upper lateral incision. From here the suture is carried down through the lid along the under surface of the orbicularis to emerge through the lower lateral incision adjacent to the lid margin; then through the dermis, 2 mm. above the lid margin, to emerge through the lower nasal incision; then along the under surface of the orbicularis to emerge through the upper nasal incision. The suture is tied with the knot in the depths of the upper nasal incision. As the suture is tied, it is pulled tight enough to elevate the upper lid 2 mm. above the desired final position (fig. 2). If there is palsy of the superior rectus, the cornea is protected for a day or

* From the Wilmer Ophthalmological Institute of The Johns Hopkins Hospital and University.

so by whatever means the surgeon is accustomed to employ with ptosis operations. A small dressing is placed over the superior nasal incision only for one day. It is seldom necessary to hospitalize the patient more than a day after operation.

The operation is best performed under general anesthesia because local anesthesia, even in the form of a nerve block deep within

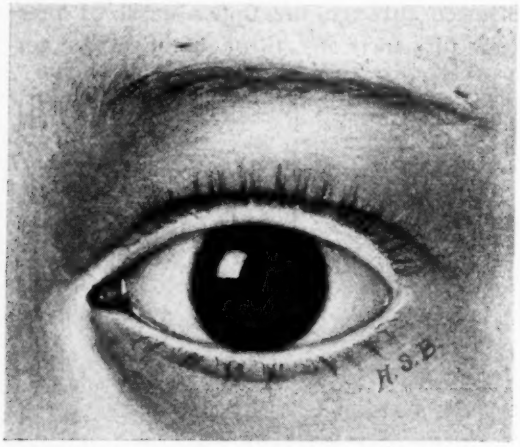

Fig. 2 (Friedenwald and Guyton). Appearance after tying suture.

the orbit, produces enough change in the resulting position of the lid to make it difficult to estimate how firmly the suture must be pulled together as it is tied.

The exact type and size of suture material may be varied considerably, depending upon what is most readily available. Smaller silk sutures, cotton sutures, braided nylon sutures, and braided tantalum sutures of various sizes have all been used with essentially equal success. The optimal size of braided tantalum for this procedure is probably 2-0. In instances where a larger braided tantalum suture was used, the path of the suture along the lid margin was subsequently visible. We have not used tantalum sutures recently because of reports of late fragmentation of tantalum wire following certain plastic procedures and of late fragmentation of tantalum mesh used in the repair of hernias.

Any size and type needle may be used so long as the needle is long enough and strong enough to be pushed through the proper paths. However, of a number of different needles we have tried, a No. 5 three-eighths curve surgical cutting needle has been the easiest to manipulate. The needle is best inserted with a strong clamp such as the Halsted.

It is most important that the suture be placed at the proper depth adjacent to the lid margin. If it is placed superficially in the fibrous layers of the chorium, it will hold firmly; or if it is placed much deeper, in the tarsus, it will hold firmly. However, it must not be placed in the loose connective tissue between skin and tarsus because it will gradually slip upward in this loose tissue with a resulting undercorrection of the ptosis.

Results of operation

Description of cases. During the past four years, 31 such operations have been performed on 23 patients; in 8 of the patients the ptosis was bilateral, while in the remaining 15 it was unilateral. In 15 cases, the ptosis was congenital; in 5 it was posttraumatic; in 2 it was a result of progressive nuclear ophthalmoplegia; and in one, it was a result of cutting the levator in a jaw-winker. Ten of the patients had had previous ptosis operations with unsatisfactory results. These previous operations included Blascovicz operations in 5 cases; a Tansley-Hunt in one; a Machek in one; a Dickey in one; a fascia lata sling (Derby) in one; and a Motais in one. In 18 instances there was complete levator paralysis, and in the remaining 13 there was doubtful or slight levator action. There was complete paralysis of the superior rectus in 13 instances, slight to moderate palsy of the superior rectus in 8, and normally functioning superior recti in the remaining 10.

Operative course. The lids tended to slip below the positions to which they were elevated for 2 or 3 weeks following operation,

but there was generally no further slip after this length of time. The actual amount of slip depended on how tight the suture was tied, there being a greater slip if the suture was tied with very tight tension than if it were tied only firmly. In general, if the suture was tied tight enough to elevate the lid margin about 1 mm. above the limbus with the eye in the primary position, the slip amounted to about 2 mm., so that the final position of the lid was excellent.

Postoperative complications were encountered in five instances.

1. In a patient with bilateral ptosis, the initial correction was excellent for each eye and continued so until four months later when the child was struck a heavy blow on one brow.

The initial operations had been performed with a 4-0 silk suture. Immediately following the blow the ptosis completely recurred, apparently indicating a break in the suture. One month following the blow the ptosis was again corrected according to the same technique and the result was again excellent and remained that way.

In three instances there were late infections around the sutures.

2. In the first of these, operations had been performed on both eyes and the initial results were excellent. Six weeks later, a chronic infection became manifest around the suture in the left lid. This infection cleared after administration of systemic penicillin without the necessity of removing the suture, but the left lid thereupon drooped 3 mm. lower than the right. Five months later another operation of the same type was performed on the left lid without complication and with an excellent result.

3. In the second of these cases, a chronic infection became manifest around the suture two months after operation. The suture was removed and the infection rapidly disappeared. The lid remained elevated in the same position it was before the infection appeared and the result remained excellent even though the suture was removed. The infection in this instance was chronic in nature, and apparently enough fibrosis had occurred along the suture tract before the suture was removed to obviate the necessity of the suture remaining in place to hold the lid in proper position.

4. In the third case the result was excellent until five months after operation, when an abscess occurred around the suture. This suture was removed and the infection quickly cleared but the ptosis partially recurred. There was still, however, a final total correction of 4.5 mm. in the position of the lid, and a good lid fold was retained.

5. The fifth complication consisted of an exposure keratitis. In this case, operations were performed on both lids of the patient with bilateral congenital ptosis and bilateral superior rectus palsy. At the time of operation, the lids were elevated too high, approximately 3.5 mm. above the upper limbus in each eye. The lower lids were pulled up over the corneas by means of sutures fastened to the forehead with adhesive for a period of one day. These protection sutures were then removed and, within two days, exposure keratitis began to develop in each eye. The patient was anesthetized, and the upper lids were grasped about 3 mm. above the lid margins with two Allis clamps and pulled downward forcibly until sufficient slip had occurred in the sutures to position the lid margins just at the upper limbus. The lids were then sutured together temporarily with two mattress sutures for each eye. These sutures were removed four days later, at which time the exposure keratitis had healed with slight residual scarring. No further keratitis developed and the final correction of the ptosis was satisfactory.

Exclusive of these five cases, in which complications occurred, and of one additional case in which the result was not recorded, the cosmetic results in the remaining 17 cases were graded as excellent in 12, good in 4, and 2 mm. undercorrected in one.

Comment

We believe that utilization of the frontalis is the type of operation best chosen for ptosis characterized by complete or almost complete paralysis of the levator and with palsy of the superior rectus, or in the presence of normally functioning superior recti if the patient has binocular vision.

The technique we have described for this operation is a simple one. It may be performed regardless of previous ptosis operations and may be repeated or followed by another type of ptosis operation should such prove necessary. We do not believe that this operation should be used in preference to a procedure which utilizes the levator, such as the Blascovicz operation, if there is appreciable function in the levator. However, in some instances a Blascovicz operation does not give a good cosmetic result even though the patient apparently does not have complete paralysis of the levator. In five such instances, utilization of the frontalis has given excellent results in four and a satisfactory result in the remaining one.

The one major point about which we are uncertain is whether this operation will prove permanently effective. It is possible that there may be some recurrence of ptosis, due either to very gradual "slip" or cutting in of the suture or to actual breakage of the suture years after the operation is performed. However, if such proves to be the case, the operation can easily be repeated or a different operation can be performed.

One of the most important aspects of this operation is the resulting lid fold. If the suture is placed parallel to the lid margin, actually in the dermis rather than in the loose subcutaneous tissue, a normal appearing lid fold usually results. We have not seen such lid folds result from other techniques of anchoring the lid to the frontalis; in fact, these lid folds are generally better than those obtained with operations utilizing the levator.

Summary

A simple, yet effective, technique of correcting ptosis by utilizing the frontalis consists of placing a single, permanently buried suture in the shape of a rhomboid connecting the dermis of the lid just above the lid margin to the fascial termination of the frontalis. The initial correction at the time of operation must be an overcorrection of about 2 mm. because the lid slips back downward about this distance within three weeks after operation.

This operation has been performed on 31 eyes of 23 patients. Postoperative complications have consisted of a broken suture following trauma to the brow in one instance, late infections around the sutures in three instances, and exposure keratitis immediately following operation in one instance. None of these complications proved serious, and the cosmetic results have been satisfactory both with regard to the final position of the lids and the resulting lid folds.

Johns Hopkins Hospital (5).

Reference

1. Kitlowski, E. A.: Personal communication.

VISUAL-FIELD INTERPRETATIONS IN CHIASMAL LESIONS*

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The greatest difficulty in visual-field interpretations is from lesions in the chiasmal region. In this area lies the optic chiasma which is made up of visual fibers from the optic nerves that enter into it anteriorly. After a rearrangement of the fibers, they leave the chiasma posteriorly as the optic tracts. It is only in this region, therefore, that it is possible to get field changes limited to one eye or to both, and varying from blindness to temporal or nasal defects and to combinations of these.

This compact area contains many structures, pathologic conditions of which may cause field defects. Above the chiasma is the diencephalon, and below are the pituitary gland and the base of the skull. Surrounding the chiasma is the circle of Willis with its many anastomosing vessels, the main cerebral arteries, the venous sinuses, some of the intracranial nerves, and the meningeal membranes with their arachnoidal granulations.

PATHWAY OF FIBERS IN OPTIC CHIASMA†

The optic chiasma is an oblong structure which measures about 13 mm. transversely, 8 mm. anteroposteriorly, and 3 to 5 mm. in thickness. According to Schaeffer[1] and other investigators, it rarely lies in the chiasmal groove which is in front of the tuberculum sellae. In 91 percent of the 125 skulls studied by Schaeffer, the chiasma lay above the diaphragma sellae so that its posterior part was partially on the dorsum sellae behind. In 4 percent, the major part of the chiasma lay upon the dorsum sellae; and in the remainder, the chiasma was in the sulcus chiasmatis.

Within the chiasma, the fibers from the optic nerves are arranged in a fairly regular pattern. Those from the inferior nasal halves of the retinas cross in the anterior part of the chiasma until almost to the other side; while the fibers from the superior nasal halves of the retinas stay on the same side of the chiasma until almost to the optic tracts and then cross in the posterior part of the chiasma. After crossing, the fibers leave the chiasma, posteriorly as the optic tracts, and form the inferior and superior nasal halves of the tracts. The fibers from the lower temporal halves of the retinas stay near the outer borders of the chiasma, while the fibers from the superior temporal halves arch toward the middle. The temporal fibers do not cross but proceed posteriorly to form the lower and upper temporal halves of the optic tracts. The macula fibers also divide into crossed and uncrossed fibers, the crossing taking place near the posterior border of the chiasma.

PITUITARY-GLAND FORMATION‡

In typical pituitary tumors, the pressure is first on the anterior border of the chiasma causing loss of the upper temporal fields. Later there is loss of the lower temporal fields. The arched fibers from the upper temporal quadrants are next involved, and lastly, those near the lateral borders, causing loss of the lower and upper nasal fields, respectively. A pituitary tumor may grow under the chiasma and press upon an optic nerve, resulting in monocular blindness before involving the other eye; or, it may grow backward and press upon an optic tract, resulting in homonymous hemianopsia. The

* Read before the New York Society for Clinical Ophthalmology, November 4, 1946.

† See illustration: Traquair, H. M.: An introduction to Clinical Perimetry. St. Louis, C. V. Mosby Co., 1931, p. 66.

‡ See illustration: Grinker, R.R.: Neurology, Springfield, Illinois, Charles C Thomas, 1937, p. 40.

suprasellar tumors usually press from above downward, often upon the posterior part of the chiasma so that the macula fibers may be involved. Third-ventricle tumors usually involve the posterior part of the chiasma and the macula fibers. As a rule, atypical field defects are due to tumors other than pituitary tumors.

Of primary interest in this area is the pituitary gland. Roughly, the gland is made up of two parts—the anterior and posterior lobes. The posterior lobe starts as an outpouching from the diencephalon and grows downward, retaining its connection with the brain by means of a stalk, the infundibulum. The anterior lobe starts as an outpouching from the posterior wall of the pharynx and grows upward and around the posterior lobe to invest it. As the base of the skull develops, the anterior lobe loses its connection with the posterior pharynx. Vestigeal remains of the buccal part of the pituitary gland may be found in the posterior wall of the nasopharynx, lining an opening sometimes present from the pituitary fossa to the base of the skull—the craniopharyngeal canal; or they may appear as a small island of primitive tissue within the sella turcica. Either of these may commence to grow and form the so-called Rathke's pouch tumor, craniopharyngeoma, or suprasellar cyst.

Anatomy of the diencephalon[§]

The gland lies within a fossa, the sella turcica, the roof of which is formed by dura called the diaphragma of the sella. This is pierced by the pituitary stalk. The optic chiasma lies above the sella turcica with the pituitary stalk in proximity to its posterior border. Just anterior to the sella turcica is the tuberculum sellae which is sometimes the seat of a meningioma giving rise to the so-called pituitary syndrome of the adult.

Lateral to the chiasma are the internal carotid arteries which here divide to form the middle and anterior cerebral arteries. These give off anterior and posterior communicating branches which join with communicating branches from the posterior cerebrals to form the circle of Willis. Aneurysms and sclerotic changes in these vessels may press upon the chiasma and cause field changes. Anterior to the chiasma are the olfactory grooves on the base of the frontal lobes of the brain. These are sometimes sites for tumors which may be difficult to differentiate from chiasmal lesions.

As previously stated, the stalk of the pituitary gland arises from the diencephalon, which here is the floor of the third ventricle. Tumors in this area may give symptoms and field changes difficult to distinguish from pituitary adenomas or from suprasellar cysts.

Anatomic differences[‖]

Sella turcica

Atypical field defects from pituitary tumors may be due to anatomic differences in the pituitary fossae. In some cases, the anterior or posterior walls may be faulty, and the tumor will naturally grow in the direction of least resistance. The direction of growth may also be influenced by the relation of the thickness of the anterior and posterior walls and also by the diaphragma sellae. The latter may be thick and strong; or it may be very thin or even missing. The opening for the hypophysial duct may be very large so that a tumor can go through without rupturing the diaphragma. In these cases, the tumor may not cause enlargement of the sella but will present as a suprasellar growth. It is also interesting to note the relation of the sphenoidal sinuses to the pitu-

[§] See illustration: Grinker, R. R.: Neurology. Springfield, Illinois, Charles C Thomas, 1937, p. 40.

[‖] See illustration: Schaeffer, J. P.: Anatomical Record, **28**:245 (July) 1924.

itary fossa. The intervening bone may be so thin or deficient that a retrobulbar neuritis from sinus infection can readily be explained. Very occasionally a bitemporal field defect may be found in this condition. Rarely, the pituitary tumor may rupture and grow into the sinus.

Blood vessels at base of brain[¶]

In addition, anatomic variations of the blood vessels may help to modify the field changes. The anterior cerebral arteries are most commonly at fault in this respect. These usually cross over the optic nerves, but at times may cross the optic chiasma, and rarely may be found as far back as the optic tracts. Less often, the posterior communicating arteries which connect the internal carotids with the posterior cerebrals may pass over the optic tracts. In all of these locations, a tumor from below may press the chiasma against the vessels so that they may act as pressure cords with consequent destruction of visual fibers. In addition to direct pressure, a certain amount of ischemia due to interference with the local blood supply may further modify the fields.

With the field defects, there are frequently clinical signs and symptoms which are of help in localizing the lesions.

The mammillary bodies and the tuber cinereum surround the base of the stalk. These structures are part of the hypothalamus which controls the vegetative nervous system. The posterior portion seems to regulate the sympathetic system, while the anterior part regulates the parasympathetic system. Injury to these parts causes diabetes insipidus, Frölich's syndrome (adiposogenital dystrophy), disturbances in sugar and fat metabolism, disturbances in temperature regulation (particularly around the third ventricle), disturbances of emotions, and disturbances of sleep, so that there may be drowsiness, loss of sleep or sleep inversion.

[¶] See illustration: Jamieson, E. B.: Illustrations of Regional Anatomy: Section 1. Baltimore, Wm. Wood & Co., 1934, p. 43.

Tumors of chiasmal region

Pituitary adenomas

Pituitary adenomas are the most frequent tumors in the chiasmal region. To date, there has been no recorded tumor of the posterior part of the pituitary gland. The anterior portion consists of two types of cells: (1) Cells which contain granules that take either the acid stain—acidophiles, or the basic stain—basophiles. (2) Cells with large nuclei and clear-staining plasma—the chromophobes.

Tumors of the acidophile cells cause symptoms which vary according to the age of the patient. In the young, whose bones are still in the stage of growth, the outstanding features are gigantism and early development of the secondary sex characteristics. In the adult, there is acromegaly, characterized by overhanging supraorbital margins, broadening of the nose, and progressive enlargement of the hands and feet.

According to Cushing,[2] tumors of the basophile cells results in hirsutism and elevation of blood pressure, symptoms usually associated with tumors of the adrenal glands.

Abnormal growth of the chromophobe cells results in pressure atrophy of the chromophile cells. The symptoms are, therefore, due to loss of function of the latter. In children, there is infantilism; while in adults, there are increases in the body fat and loss of libido or menses.

Features common to the above tumors are enlargement or destruction of the sella turcica, field defects which progress to blindness, and primary optic atrophy. Typically, there is first a loss of the upper temporal field, then the lower temporal, lower nasal, and, last, the upper nasal field. The tumor may occasionally cause blindness in one eye before involving the fields of the other eye, or there may even be homonymous hemianopia because of involvement of the optic

tracts. Infrequently, the tumor may break through the diaphragma of the sella and cause symptoms resulting from irritation or destruction of the diencephalic region of the brain.

Craniopharyngioma

The next most common type of tumor is the craniopharyngioma. As these tumors are derived from embryonal rests, they usually occur in the young. In fact, next to cerebellar tumors, they are the most frequent tumors of childhood. The field changes are varied but more or less typical of tumors in the chiasmal region. Because of pressure on the posterior part of the chiasma, central or caecocentral scotomas are frequent. There may be primary or secondary optic atrophy or even choked discs. Frequently symptoms of involvement of the diencephalon are present. In addition, they cause destruction of the chromophile cells and give symptoms characteristic of chromophobe tumors. The sella turcica may or may not be enlarged. X-ray examination of the skull usually shows the presence of calcified plaques in the chiasmal region.

Meningioma of tuberculum sellae*

Meningiomas of the tuberculum sellae are fairly frequent. They are benign and can be removed in toto if not too large, so that an early diagnosis is important. They arise from the meninges,[3] probably from the arachnoidal granulations in the venous sinuses. They are called the chiasmal syndrome of the adult. Recently, Schlezinger[4] reported such a tumor in a girl, aged 16 years. This is considerably below the average age. These tumors usually present anteriorly to the chiasma and press directly on the optic nerves, causing atypical temporal field defects. Because of the vulnerability of the macula fibers, central and paracentral scotomas are frequent. Primary optic atrophy is constant and progressive. The sella turcica is not enlarged, because the tumor is well outside of the sella turcica.

Less common tumors

Among the less common tumors in this region are tumors of the sphenoidal ridge. These cause a progressively increasing exophthalmos, paralyses of the external ocular muscles, and atrophy of the optic nerve. X-ray examination shows increased density of the sphenoid ridge. All the findings are on the side of the lesion. The condition is sometimes known as the syndrome of the cavernous sinus.

Aneurysms of the circle of Willis have been fully described by Walsh.[5] They are characterized by unusual field changes, frequently with central or paracentral scotomas, pains in the back of the eyes, and ocular-motor paralyses, most commonly involving the third nerve. A previous episode of subdural bleeding makes the diagnosis definite.

Third-ventricle tumors are uncommon but should be thought of in patients giving symptoms and field changes suggestive of lesions around the chiasma. There are usually disturbances of the vegetative nervous system, especially the persistence of an unexplained fever. Central and paracentral scotomas are frequent.

Arachnoiditis[6] in the chiasmal region may give symptoms typical of tumor. In fact the cysts often found are a form of tumor. There is usually a history of rapidly developing blindness. The discs have the peculiar appearance of a mixed primary and secondary atrophy. A preceding history of head trauma, sinus infection, or lues is of etiologic importance. If tumors are suspected, early surgery, before irreparable blindness supervenes, is important.

Meningioma of the olfactory groove is really a frontal lobe tumor. A Foster-Kennedy syndrome, optic atrophy on the same

* See illustration: Bailey, P.: Intra-Cranial Tumors. Springfield, Illinois, Charles C Thomas, 1933, p. 172.

side with a choked disc in the other eye, is an important sign if found. More frequently, it is absent, and occasionally it may be present in other conditions. Anosmia, loss of smell, on the side of the lesion is present.

Other tumors, such as chordomas, are rare and are usually diagnosed at operation.

Report of cases

Case 1

C. M., a woman aged 29 years, was admitted to the Brooklyn Hospital with a history of intermittent headaches of 10 years' duration. For the past six months, her vision had become progressively more blurred and her sense of smell had been lost. She also had a constant buzzing in the left ear.

X-ray examination showed an area of lessened density of the frontal bone which was almost centrally placed a little above the orbits. The sella turcica was not well defined but it was enlarged. The floor was depressed, and the posterior clinoid processes were eroded. In view of these findings, it was thought that a tumor of the sella turcica, or of the area around it, and a tumor of the frontal bone were present. The growth in the frontal bone was thought to be metastatic.

Ocular examination. There were no ocular palsies and no nystagmus. The pupils reacted to light and accommodation. There was about 5 or 6 diopters of swelling of both discs, with a few hemorrhages around the left disc but none around the right. Vision in the left eye was so poor that a 10-mm. test object was the smallest that could be used. This showed a complete loss of the nasal field with retention of a small island in the temporal field. The visual field of the right eye could be plotted with a 2-mm. test object and showed a marked concentric contraction with a loss of the nasal field. There was no evidence of secondary atrophy of either disc.

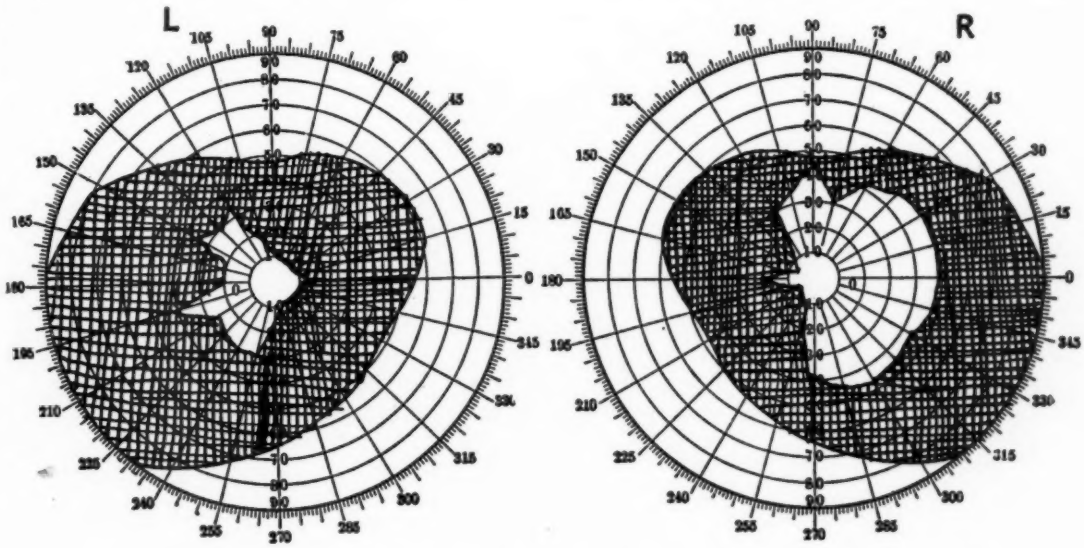

Fig. 1 (Kravitz). *Case 1.* Left: field for 10/250 mm. white; right: field for 2/250 mm. white.

Diagnosis. As a result of this examination, it was thought that the condition was tumor of the left side of the brain, near the chiasm. For the degree of intracranial pressure and the headaches complained of by the patient, she was markedly euphoric and jocular. There was a distinct forward bulge in the middle of the forehead.

The neurologist found no signs of localizing value and was of the opinion that the condition was a tumor of the frontal lobe.

A bone flap in the right frontal region was turned down and a meningioma, the size of a small orange, occupying the frontal aspect of both anterior cranial fossae, was removed.

The loss of both nasal fields was probably caused by a flattening of the chiasm against both internal carotid arteries.

CASE 2

C. A., a man aged 27 years, gave a history of loss of libido for about 12 years. He was treated with glandular preparations. After a while, he complained of visual disturbances, and glasses were prescribed. For some time he continued to receive glandular therapy and, every now and then, he would have a severe headache. Vision deteriorated so slowly that he was not conscious of its loss until it was well advanced. Recently his headaches became severe and persistent and were accompanied by projectile vomiting.

Physical examination showed the patient to be short and slight of build, with no hair on the face. He had small delicate hands and feet with the voice of a preadolescent boy. He had complete loss of sexual power.

Ocular examination. Vision was 20/70 in each eye, not improved with correction. Both discs showed advanced primary atrophy. The visual fields showed practically complete bitemporal hemianopia.

A right transfrontal osteoplastic craniotomy was performed and a cyst, extending anteriorly to the chiasm, was removed. When it was opened, a large amount of yellow fluid containing fatty deposits was evacuated. Immediately below the chiasm and pressing upward into its structure was a large globular irregular mass of cholesterol. It extended into the tissue of the chiasm. Part of the wall of the cyst and as much of the cholesterol as possible were removed without severing the chiasm.

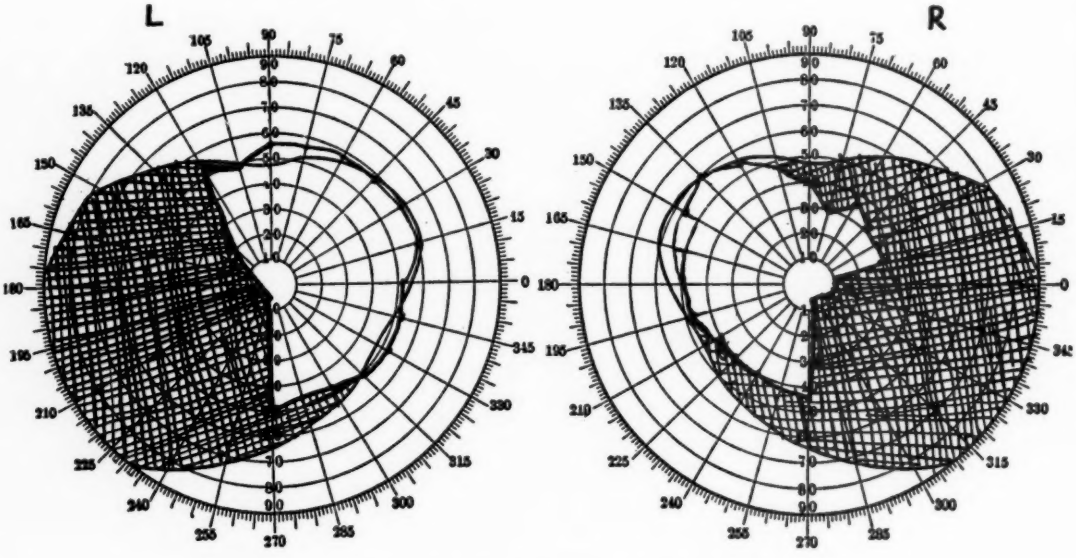

Fig. 2 (Kravitz). *Case 2.* Left and right: fields for 2/330 mm. white.

CASE 3

L. T., a woman, aged 50 years, gave a history that 13 years before, she had noticed a tingling of her hands and feet. One year

later, and until about four years before admission, she began to grow larger in all dimensions. During this period, she gained about 100 pounds and her hands and feet grew so large that she had to wear men's sizes. About two years ago she began to have pains in her legs, and about six months later, she developed polyuria and polydipsia. At this time she received X-ray treatments to the pituitary gland. This was followed by a loss of vision in the left eye. Her periods started at the age of 13 years and were normal until her menopause at the age of 44 years.

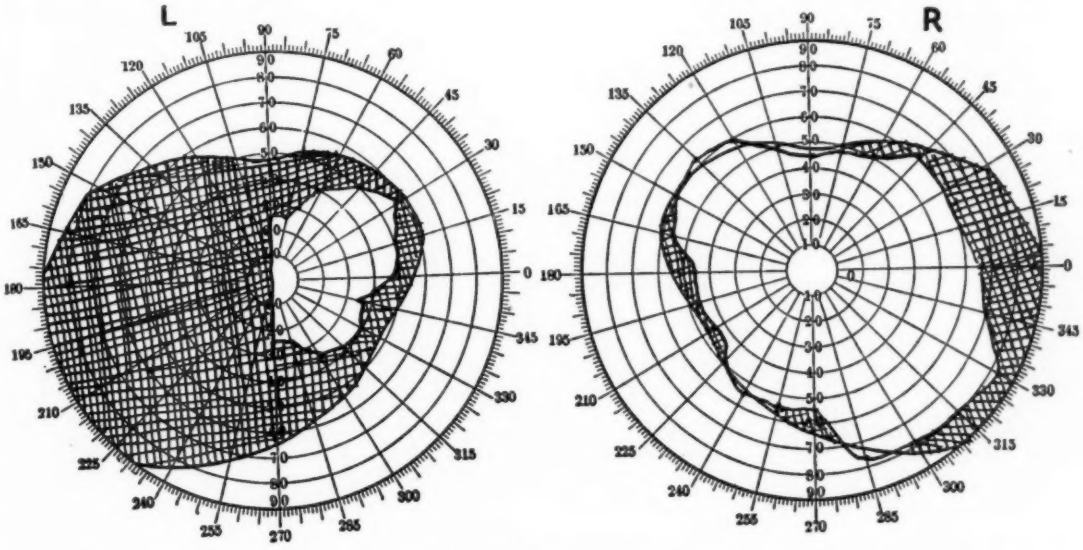

Fig. 3 (Kravitz). *Case 3.* Left: field for 40/250 mm. white; right: field for 2/250 mm. white.

Physical examination revealed a typical acromegalic type.

Ocular examination. Vision was: R.E., 13/13; L.E., perception of fingers at 12 inches. The left pupil was slightly larger than the right but both reacted to light and accommodation. The margins of the right disc were blurred, although no measurable edema was present. The disc was pale. With a 2-mm. test object, the right eye showed a moderate loss of the temporal field, most marked above. With a 40-mm. test object, there was a complete absence of the temporal field in the left eye and a concentric contraction of the nasal field. Through a transfrontal approach, an acidophilic adenoma was removed. A knuckle of this had broken through the diaphragma sellae and was pressing upon the diencephalon.

CASE 4

W. C., a Negress, aged 32 years, gave a history of failing vision for one year. About six months before, her menses stopped and she began to have occasional frontal headaches usually with vomiting. She had a continual thirst and an excessive craving for "sweets." The neurologic examination was entirely negative.

Ocular examination. Vision was: R.E., limited to perception of hand movements on the nasal side; L.E., perception of fingers at two feet. The visual fields were unreliable but suggested a right homonymous hemianopia. A month later, she developed optic atrophy in both eyes. At operation, a large suprasellar cyst was exposed and about 30 cc. of xanthrochromic fluid was evacuated. The following day, the patient was able to count fingers with either eye at five feet. It was

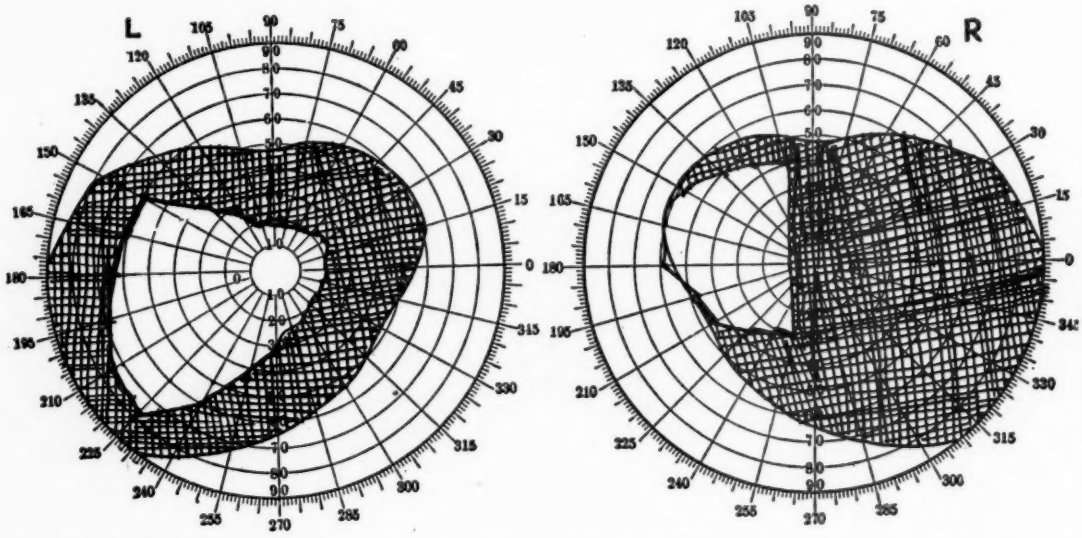

Fig. 4 (Kravitz). *Case 4.* Visual acuity in the left eye is limited to finger movements at two feet; in the right eye, hand movements.

felt that a good deal of the previous loss of vision was probably hysterical in origin.

CASE 5

J. G., a Negro, aged 34 years, gave a history that about nine years before, he began to grow in size and his features changed. About five years before, vision in the right eye began to fail and the hair on his face and pubis become more scant and his sexual power impaired. Gradually he became more lethargic so that he was unable to work. In a period of nine years, he had grown about 5 or 6 inches.

Physical examination showed a very tall, thin Negro who appeared ill and toxic. His features were typically acromegalic and his mentality was dull. X-ray studies of the

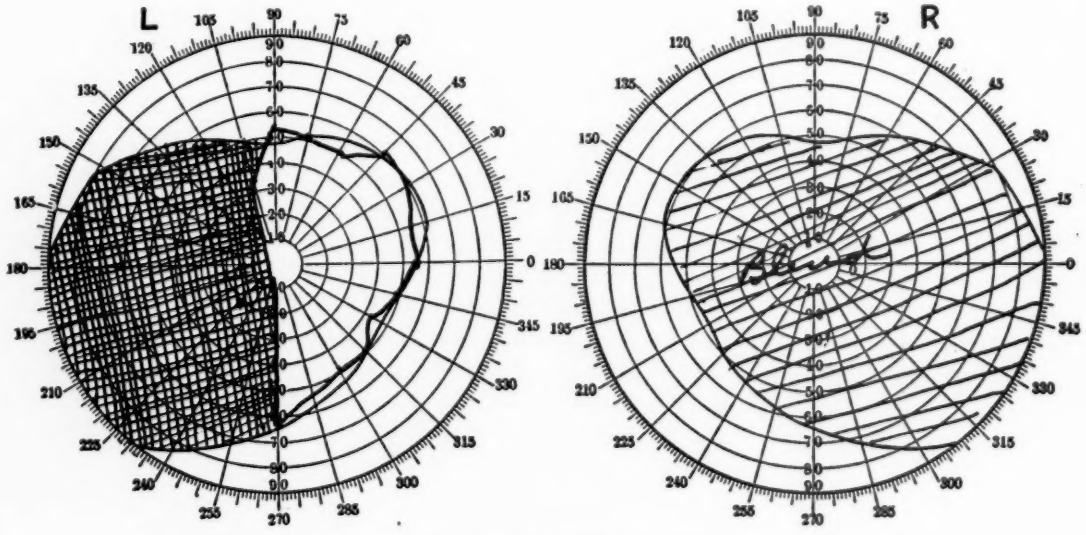

Fig. 5 (Kravitz). *Case 5.* Left: field for 2/330 mm. white. The right eye is blind.

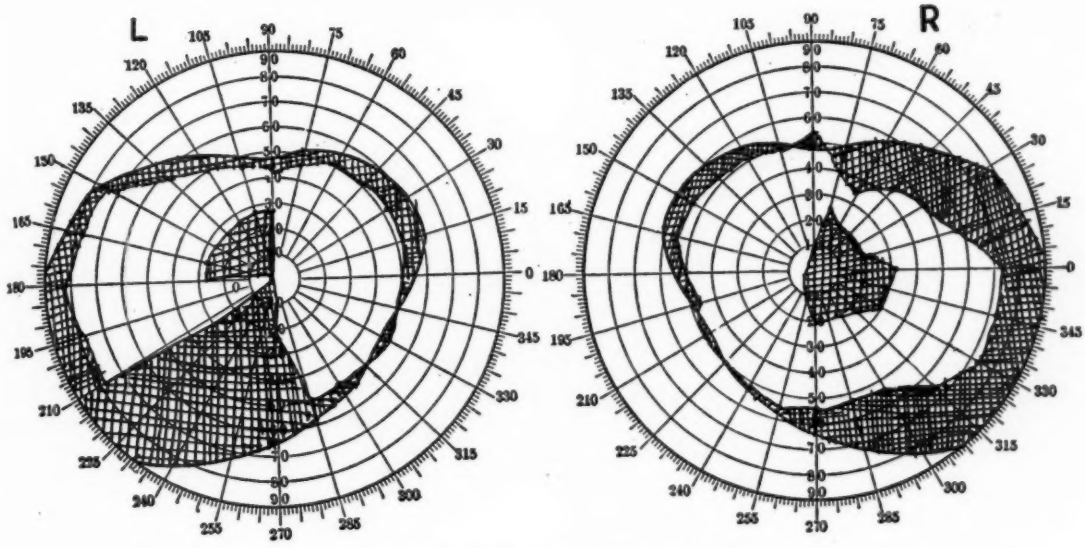

Fig. 6 (Kravitz). *Case 6.* Left: field for 5/250 mm. white. Visual acuity in the right eye is limited to hand movements.

skull showed an immense sella turcica with anterior and posterior clinoid processes eroded.

Ocular examination. There was advanced optic atrophy of the right disc with imperfect light perception. The left disc was of good color and there was a complete loss of the temporal field, with sparing of the macula. Vision was not taken because of very poor coöperation. At operation, a large cystic degenerated tumor of the pituitary gland was removed.

Case 6

A. D., a woman, aged 29 years, gave a history of failing vision for four months and

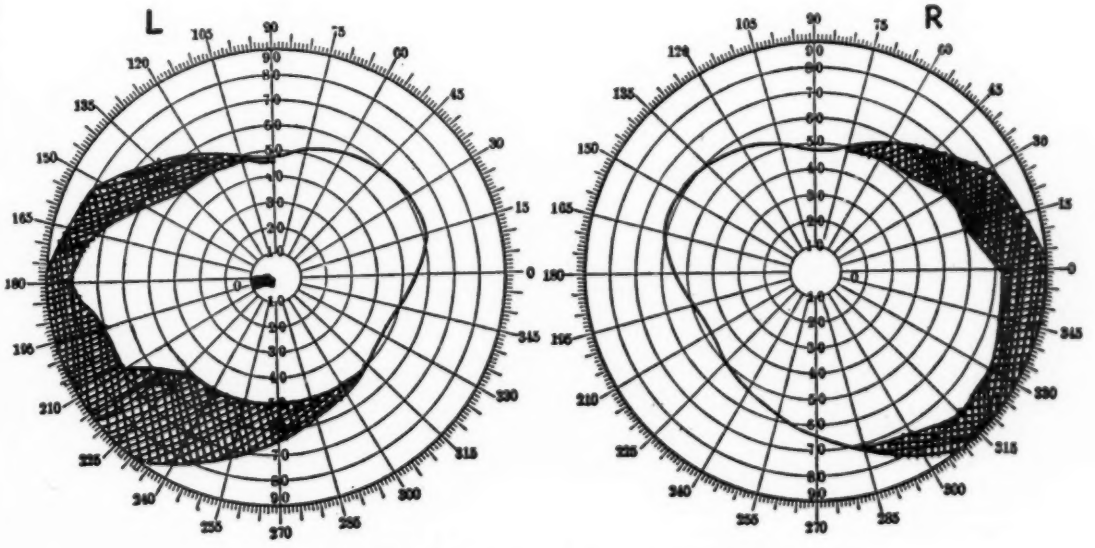

Fig. 7 (Kravitz). *Case 7.* Left and right: fields for 1/250 mm. white.

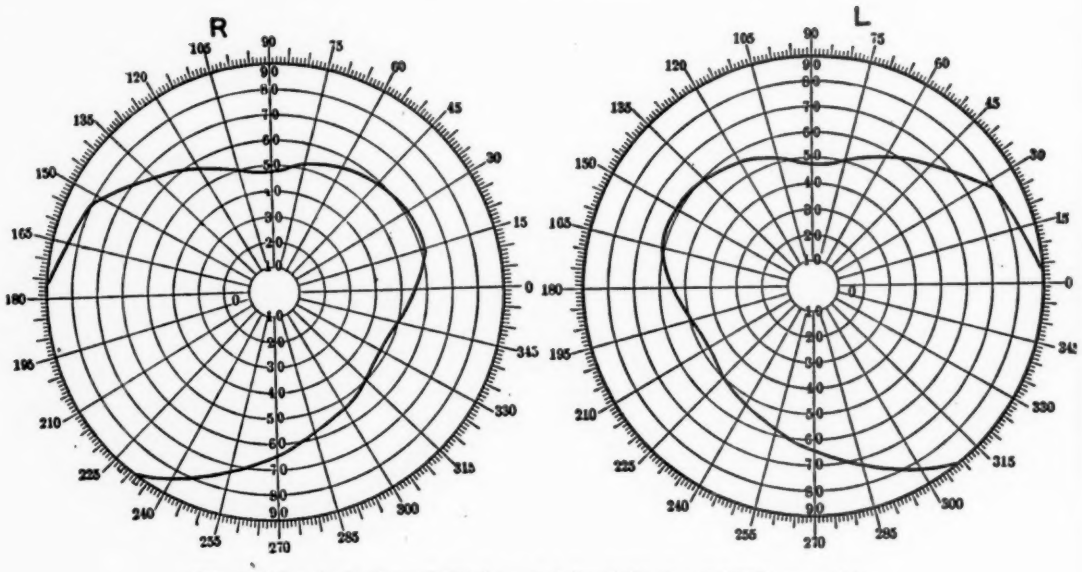

Fig. 8 (Kravitz). *Case 7.* Right and left: fields for 2/1000 mm. white.

severe periodic headaches for the past five months. The headaches came about once a month and lasted from 1 to 2 days, usually with vomiting. Her menstrual periods stopped completely about seven years before, but she had not lost or gained any weight since then. X-ray examination revealed a distended sella turcica with encroachment on the sphenoid sinuses.

Ocular examination. Vision was: O.U., 5/200, and there was moderate primary atrophy. Field examination revealed a temporal central defect in the right eye with a contraction of the temporal field. The left eye also had a loss of temporal central field with a central defect on the lower temporal area. The fields were evidence of pressure on the posterior chiasma with in-

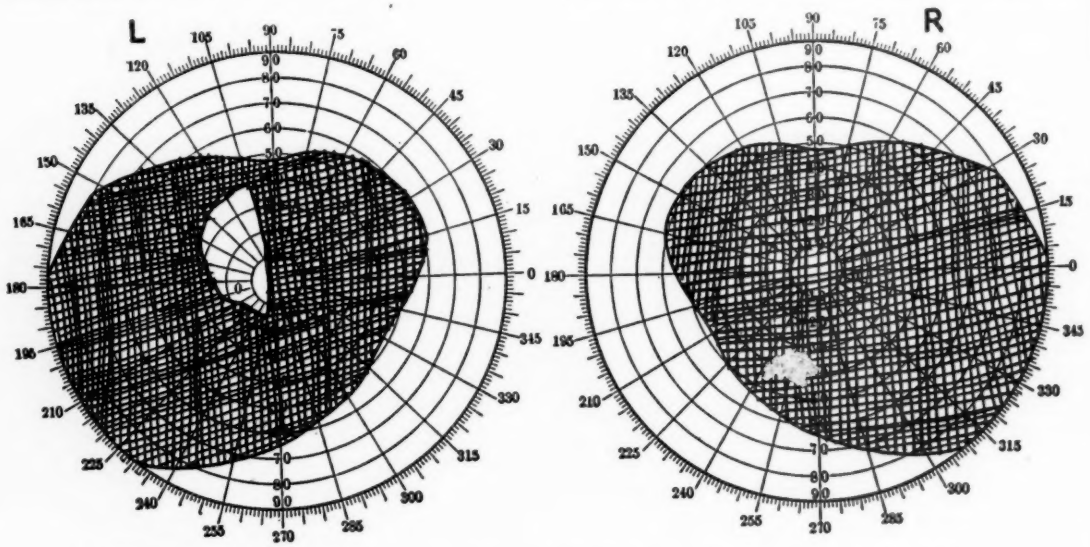

Fig. 9 (Kravitz). *Case 8.* Vision in the left eye is limited to hand movements. In the right eye, there is no light perception.

volvement of the crossed macula fibers. Operation revealed a suprasellar cyst which had encroached on the chiasm posteriorly and superiorly. A postoperative diagnosis of tumor of the pituitary gland with cystic degeneration was made.

CASE 7

M. W., a young woman, aged 17 years, gave a history that, about two years before, she had lost considerable weight. A year ago, she developed a persistent fever with headaches, nausea, and vomiting and soon thereafter she began to gain a good deal of weight and her menses became scanty and irregular. She also became dull and apathetic with symptoms of diabetes-insipidus.

Ocular examination. Vision was 20/20 in each eye and the disc borders were somewhat blurred, with slight pallor of the temporal portions. Field examination showed an enlargement of the blind spots with some loss of temporal fields, particularly of the right lower temporal. Examination two months later, showed a caecocentral scotoma of the left eye.

A diagnosis of a supra sella cyst was made.

Operation revealed an infiltrating lesion of the third ventricle with involvement of the visual fibers near the posterior border of the chiasm.

CASE 8

M. W., a woman, aged 29 years, came to the Post-Graduate Hospital because of menstrual disturbances for the past six years and failing vision for the past four years.

Previous to the onset of symptoms her menses came regularly every 28 days and lasted for four days. Now they came every two weeks and lasted one day. The visual disturbances began with blurring in one eye and then in the other, and vision had deteriorated steadily since the onset.

Neurologic examination revealed nothing abnormal, but ophthalmic examination showed pallor of both discs and left homonymous hemianopsia. Operation was performed for tumor of the pituitary gland but none was found, and the patient was discharged after recovery from the operation.

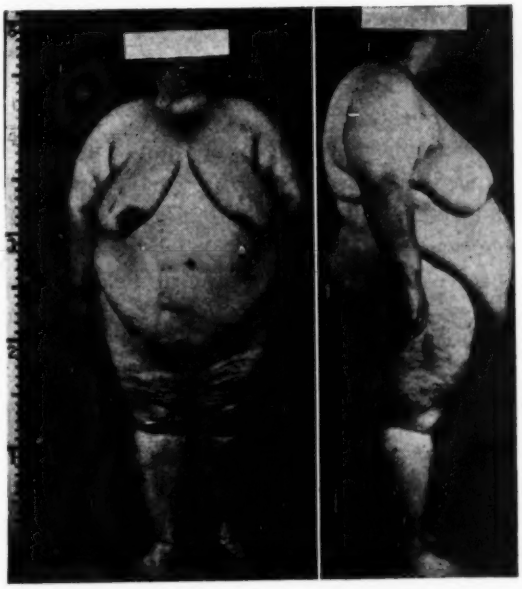

Fig. 10 (Kravitz). *Case 8.* An operation was performed on this patient for tumor of the pituitary gland, but none was found. After this she gained rapidly in weight. Several years later a second operation revealed extensive chiasmic arachnoiditis.

Unfortunately, all the original records were lost, so that more detailed information is not available.

She was readmitted with the history that, after operation, vision had failed more rapidly and she had gained considerably in weight, about 63 pounds (28.6 kg.). She had not had her menses since the operation. For the past five months she had had polyuria and polydipsia.

An encephalogram revealed a normal ventricular system and normal sella turcica, and she was again discharged for further care in the outpatient department. She was placed under mixed glandular therapy and at intervals X-ray studies of the skull were

taken. These always revealed no pathologic change.

The patient was readmitted to the Hospital three years later because her symptoms had become worse. Examination of the eyes showed a mixed type of primary and secondary atrophy of the optic nerve. The right eye was blind, and only an island of vision was retained in the temporal field of the left eye. A ventriculogram revealed dilatation of the left ventricle with cortical atrophy. The right ventricle was normal.

Operation revealed extensive chiasmic arachnoiditis, with a large cyst which had lifted the chiasm upward. The cyst was emptied and the adhesions were ruptured, but the patient's condition was not improved. When she was last seen, there was progressively increasing drowsiness and great impairment of memory.

The first operation was performed before the entity of chronic arachnoiditis was well known. If the adhesions had been separated then, the subsequent course of the patient's condition might well have been different.

Conclusion

Most of the cases herein reported, presented physical symptoms and showed loss of vision in one or both eyes before operation. If the ophthalmologist, who often sees these cases first, is to be of help, he must familiarize himself with the brain so that he will be better able to interpret the field changes as well as the patient's symptoms. To wait for typical field changes will frequently result in tragedy.

861 Park Place (16).

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Historical Miniature

Ibn Sina was the most brilliant star in the firmament of Arabian medicine, and a philosopher and statesman as well. He was born in 980 A.D. and is usually called Avicenna in mediaeval Latin. His *Canon of Medicine*, an extensive and complete discussion of all of medicine and surgery, is almost without equal in the entire world's literature.

Hirschberg in *Graefe-Saemisch Handbuch*, v. 13.

RELATIONSHIPS BETWEEN LATERAL HETEROPHORIA, PRISM VERGENCE, AND THE NEAR POINT OF CONVERGENCE*

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Numerous physiologic functions of the binocular neuromuscular mechanism have been measured for years with various kinds of testing equipment. Relatively few studies have been made to determine to what extent these various testing devices measure the same or different characteristics. This study was designed to investigate the relationships between lateral heterophoria, prism vergence, and the near point of convergence, as well as the relationship of these variables to age, sex, and refractive error.

Other partially similar studies have been made previously. Haessler[2] considered the relationship of heterophoria at 20 feet to refractive error and to the convergence angle. His sample consisted of 1,000 cases and was preselected to the extent that the following subjects were eliminated: (a) those with more than 0.5 prism diopters of hyperphoria; (b) those with more than 4.0 diopters of ametropia; and (c) those who had not worn correcting lenses for their ametropia for at least several months.

Haessler employed the Maddox-rod test for heterophoria and justified his use of it on the basis of a study by Weymouth,[7] who, with data from 12 subjects, concluded that the screen and parallax test, von Graefe's prism diplopia test, and the Maddox-rod test were essentially equivalent at a testing distance of 20 feet. Weymouth's interpretatation has since been confirmed.[5] Haessler measured prism divergence at 20 feet but calculated convergence as the convergence angle using the PcB (the near point of convergence calculated from the convergence base line). After studying the distribution of heterophoria for each category of prism divergence—that is: 1, 2, 3, 4, 5, and so forth, prism diopters—as well as for each category of the convergence angle, he concluded that there was no correlation between heterophoria and vergence as expressed in the usual clinical measurements.

Abraham[1] studied heterophoria and vergence both at 20 feet and at 13 inches in 4,000 cases. He was primarily interested in the possibility of predicting the symptoms of a patient from the measurement of heterophoria or of vergence. He found that the prism divergence at 13 inches might serve this purpose and his work has been confirmed.[4]

SAMPLE AND TESTING METHODS

SOURCE OF SUBJECTS

Records were collected for this study upon 184 male and 217 female subjects. They were either emmetropic or had been rendered so by correcting glasses prior to the study. Roughly half of the subjects had no ocular complaints whatever and were either employees or patients from other clinics. The remainder were patients from the private practice of one of us (R. G. S.), although the chief complaint of many of them was not one of asthenopia, but rather "a red eye" or "something in the eye." An attempt to get as nearly a true random sample as possible was made and it is felt that this was for the most part successful.

* This study was made under a contract with the Office of Naval Research as Project N6onr-202, Task Order I.

† From the Department of Ophthalmology, Washington University School of Medicine, and the Oscar Johnson Institute.

‡ From the Department of Zoology, Ohio State University.

Data

For each subject, a record was made of:

1. Sex.
2. Age in years to last birthday.
3. Refractive error of the right eye, recorded as the spherical equivalent.
4. Refractive error of the left eye, recorded as the spherical equivalent.
5. Near point of convergence in millimeters.
6. Lateral heterophoria in prism diopters at a testing distance of 20 feet.
7. Prism convergence break point at 20 feet.
8. Prism convergence re-fuse point at 20 feet.
9. Prism divergence break point at 20 feet.
10. Prism divergence re-fuse point at 20 feet.
11. Lateral heterophoria in prism diopters at a testing distance of 13 inches.
12. Prism convergence break point at 13 inches.
13. Prism divergence break point at 13 inches.
14. Prism divergence re-fuse point at 13 inches.

Testing methods

All subjects used were refracted by one of us (R. G. S.). Those under 40 years of age had two examinations—one under homatropine cycloplegia and a second, postcycloplegic check. Subjects over 40 years of age received a manifest refraction. If correcting lenses were needed and desired, these were prescribed and a period of one month was allowed to elapse during which time the subject became adjusted to his correction.

The methods used in measuring the near point of convergence, prism vergence, and heterophoria have already been described in detail previously.[5] Only a brief description of each should be necessary.

The near point of convergence was determined in the usual manner with a millimeter rule, the target being a May-type ophthalmoscope with the head removed and the globe illuminated.

All heterophoria measurements were made with a white Maddox rod placed before the right eye. The rod was attached to a phorometer (American Optical Co.); the movement of its image was produced by means of a Risley rotary prism which was calibrated in units of one prism diopter and had a maximum strength of 30 prism diopters.

Tests of prism vergence were made using the Risley rotary prism on the phorometer, the prism being placed before the right eye. The order of testing was as follows: (a) prism convergence, break and re-fuse point at 20 feet; (b) prism convergence, break and re-fuse point at 13 inches; (c) prism divergence, break and re-fuse point at 20 feet; and (d) prism divergence, break and re-fuse point at 13 inches. All tests for heterophoria were completed before any tests of prism vergence were made. A muscle light rather than a printed target was used in the testing of prism vergence, since the correlation coefficient for measurements made using the different type targets is very close to 1.0.[4]

The spherical equivalent for the correcting lens for each eye was calculated by taking one half of the value of the cylinder and adding it algebraically to that of the sphere.

Age, sex, and refractive error

The chief objective of this study was to examine the relationship between heterophoria, prism vergence, and the near point of convergence, but this cannot be accomplished until the mutual dependence of these functions upon age, sex, and refractive error is known. If, for example, both the prism convergence break point at 20 feet and the lateral heterophoria at 20 feet were found to depend upon age, we should be interested in the correlation between these characteristics only after the effect of varying ages has been removed.

Age vs. heterophoria, near point of convergence, and prism vergence. In the sample of 184 males, with an average age of 33.5 years and an average of 0.8 prism diopters of esophoria at 20 feet, there is not a very marked change in the heterophoria with age. Still, the correlation ($r = + 0.17$) is significant in the statistical sense, and implies that the subjects tend to change from slightly exophoric when younger to slightly esophoric when older. This correlation is definitely not enough to permit a satisfactory prediction of a subject's heterophoria from a knowledge of his age alone, since only 3 percent of the variance in heterophoria could be accounted for by so doing.

Among the 217 females, whose average age was 33.8 years and whose average heterophoria at 20 feet was 1.3 prism diopters of esophoria, the relationship appears to be the opposite of that among males. The correlation ($r = -0.20$) implies that younger females tend to be more esophoric and older females less esophoric. Again, the relationship is not sufficient for predicting heterophoria from age alone since only 4 percent of the variance in heterophoria would be accounted for by so doing.

The disagreement between males and females, positive correlation between age and heterophoria in males, negative in females, is difficult to explain. An inspection of the two-way frequency distributions in Figure 1 shows that a few males in the lower age groups were extremely exophoric; whereas, a few females of the same ages were extremely esophoric. No reason for this difference is known at present.

The near point of convergence was 49.0 mm. in males and 45.3 mm. in females, and these averages appear not to change significantly with age ($r = + 0.13$ for males, $r = + 0.06$ for females).

At a testing distance of 20 feet the prism convergence break point, averaging 18.7 diopters in males and 19.5 diopters in females, tends to decrease with increasing age; this tendency is statistically significant only in males ($r = - 0.16$ for males, $r = - 0.10$ for females). The prism divergence break point appears not to change significantly in either sex with increasing age ($r = - 0.06$ for males, $r = + 0.08$ for females).

The amount of manifest heterophoria at a testing distance of 13 inches, which averaged 4.0 prism diopters of exophoria for males and 2.3 for females, tends to increase toward more exophoria with increasing age, although this tendency is statistically significant only in females ($r = -0.12$ for males and $r = -0.19$ for females, where the correlation coefficients have negative signs because exophoria is represented on the negative side of orthophoria). In neither case is the correlation sufficiently intense to predict the amount of heterophoria from a knowledge of the age alone.

At a testing distance of 13 inches, the relationship of the break point of prism convergence to age (or to any other variable) is difficult to assess because of the nature of the frequency distribution of the prism convergence break point. For reasons which are not particularly pertinent at this point, we did not wish to introduce a Risley rotary prism before the subject's left eye when one was already before the right eye; because of this, the maximum convergence recorded was 30 prism diopters and this amount of prism convergence or more occurred in 132 of the 184 males and 164 of the 217 females. An examination of the two-way frequency distribution of the prism convergence break point and age (fig. 2) shows no obvious relationship to either sex.

Changes in age appear not to affect the prism divergence break point at a testing distance of 13 inches ($r = +0.14$ for males, $r = +0.13$ for females).

In general, the relationships of age to heterophoria and prism vergence, which are summarized in Table 1, are relatively slight if present at all. Nevertheless, it seems desirable to adjust for the possible mutual dependence upon age when examining the

relationship between heterophoria and prism vergences.

Sex vs. heterophoria, near point of convergence, and prism vergence. The males and females in this study, in addition to being comparable in age, also appear to be comparable with respect to the near point of convergence (averages: males, 49.0 mm.; females, 45.3 mm.), lateral heterophoria at 20 feet, prism convergence break at 20 feet, and prism divergence break at 13 inches. For prism divergence break at 20 feet, the difference of 0.82 prism diopters (=7.70 −6.88) is significant, having a standard error of ±0.30. Similarly the sexes are different in lateral heterophoria at 13 inches by 1.68 ± 0.54 prism diopters. Because of these differences, we have treated the sexes sepa-

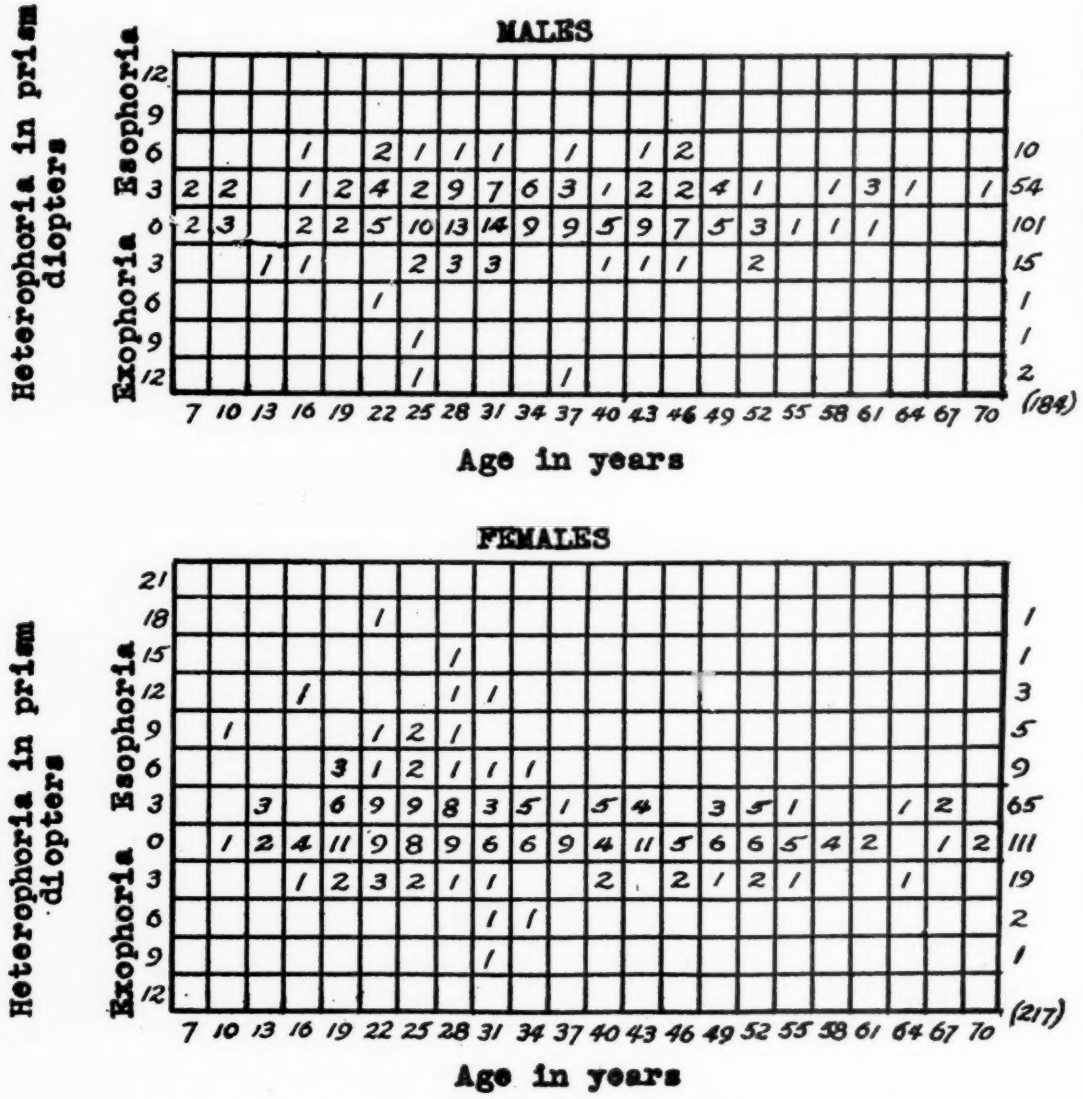

Fig. 1 (Scobee and Green). Frequency distributions of lateral heterophoria at 20 feet relative to age of subjects.

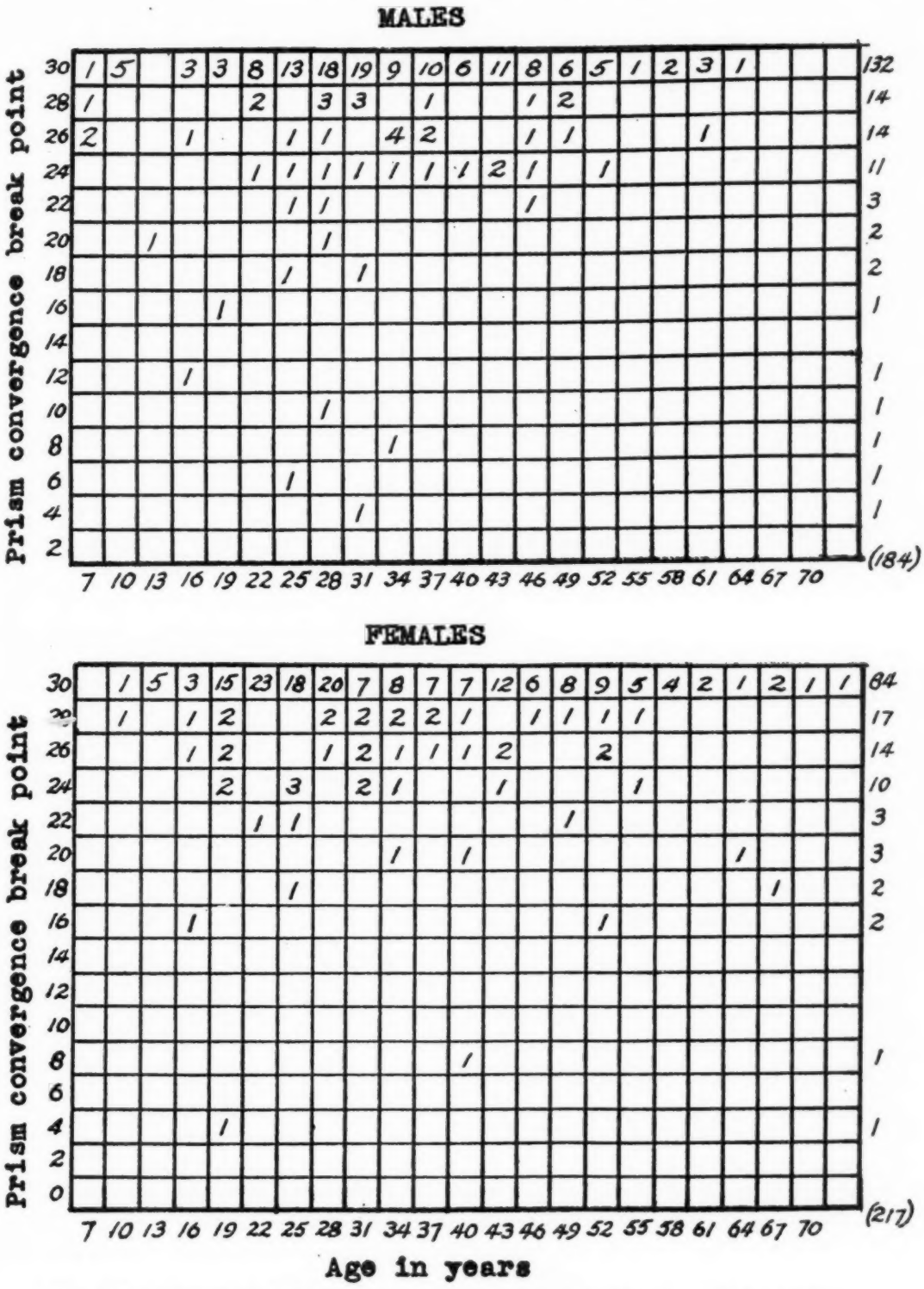

Fig. 2 (Scobee and Green). Relationship of prism convergence break point at 13 inches to age.

TABLE 1

THE RELATIONSHIPS BETWEEN AGE, REFRACTIVE ERROR, NEAR POINT OF CONVERGENCE, HETEROPHORIA, PRISM CONVERGENCE AND PRISM DIVERGENCE IN A SAMPLE OF 184 MALE AND 217 FEMALE SUBJECTS

	Sex	Avg.	S.D.*	Correlation† with: NPC	Hetero-phoria 20′	Conv. Brk. 20′	Div. Brk. 20′	Hetero-phoria 13″	Div. Brk. 13″
	(1)			(5)	(6)	(7)	(9)	(11)	(13)
(2) Age	M	33.5	12.1	+0.13	+0.17	−0.16	−0.06	−0.12	+0.14
	F	33.8	13.6	+0.06	−0.20	−0.10	+0.08	−0.19	+0.13
(3) Refractive error for O.D.‡	M	+0.13	1.51	+0.08	+0.08	−0.15	−0.01	0.00	−0.11
	F	+0.32	1.49	+0.01	−0.07	−0.11	−0.01	+0.01	0.00
(4) Refractive error for O.S.‡	M	+0.05	1.56	+0.21	+0.08	−0.20	+0.07	−0.01	−0.06
	F	+0.27	1.62	0.00	−0.06	−0.08	−0.02	+0.12	−0.03
(5) Near point of convergence (mms.)	M	49.0	30.5		0.00	−0.23	−0.03	−0.15	−0.02
	F	45.3	26.3		−0.08	−0.22	+0.08	−0.25	+0.03
(6) Heterophoria, 20′ (prism diopters)	M	+0.8	2.6			+0.16	−0.14		−0.20
	F	+1.3	3.2			+0.09	−0.18		−0.32
(7) Prism convergence break point, 20′	M	18.7	6.8				+0.09		
	F	19.5	6.4				+0.01		
(8) Prism convergence re-fuse point, 20′	M	11.2	8.6			+0.54			
	F	11.1	7.8			+0.68			
(9) Prism divergence break point, 20′	M	6.9	2.9						
	F	7.7	3.1						
(10) Prism divergence re-fuse point, 20′	M	4.1	2.1				+0.67		
	F	4.7	2.8				+0.71		
(11) Heterophoria§ at 13″ (prism diopters)	M	−4.0	4.8						−0.19
	F	−2.3	5.9						−0.32
(12) Prism convergence break point, 13″	M	28.1	—						
	F	28.7	—						
(13) Prism divergence break point, 13″	M	20.8	4.3						
	F	20.7	4.3						
(14) Prism divergence re-fuse point, 13″	M	12.5	5.2						+0 52
	F	10.8	5.2						+0.52

* S.D. = Standard deviation.
† Product moment coefficients of correlation. To be judged significant with a 5% chance of being in error, it should exceed ±0.14; with a 1% chance, ±0.18.
‡ Spherical equivalent of the refractive correction.
§ + means esophoria, − means exophoria.

rately. The averages and the standard deviations of the distributions about the averages are given in Table 1.

Refractive error vs. heterophoria, near point of convergence, and prism vergence. In neither the males nor the females is there any systematic association of the amount of refractive error with the amount of heterophoria, the near point of convergence, or with prism vergence at 20 feet or 13 inches.

HETEROPHORIA, PRISM VERGENCE, AND THE NEAR POINT OF CONVERGENCE

Heterophoria and prism vergence. The observed correlation coefficients between lateral heterophoria and the prism convergence break point at a distance of 20 feet

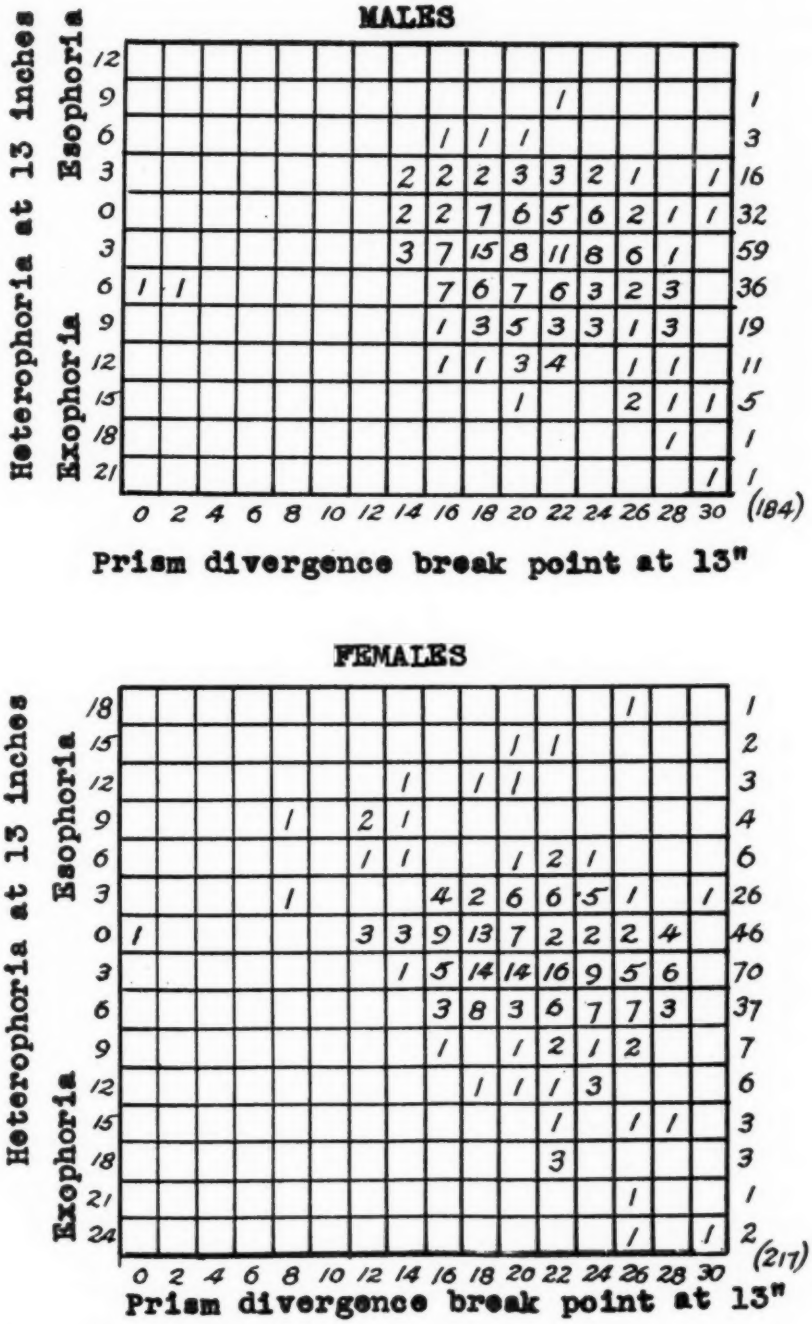

Fig. 3 (Scobee and Green). Relationship of heterophoria at 13 inches to prism divergence break point at 13 inches.

were +0.16 for males and +0.09 for females. When these coefficients are adjusted by removing the common effect of age, the partial correlation coefficients are +0.19 for males and +0.07 for females. The adjustments for age are in opposite directions because the relationships between heterophoria and age are different in the two sexes. The

partial coefficient is statistically significant for males but not for females. The adjusted coefficients for the relationship between heterophoria and the prism divergence break point at 20 feet are about on the border line of significance ($r_a = -0.13$ for males, $r_a = -0.17$ for females), suggesting that greater

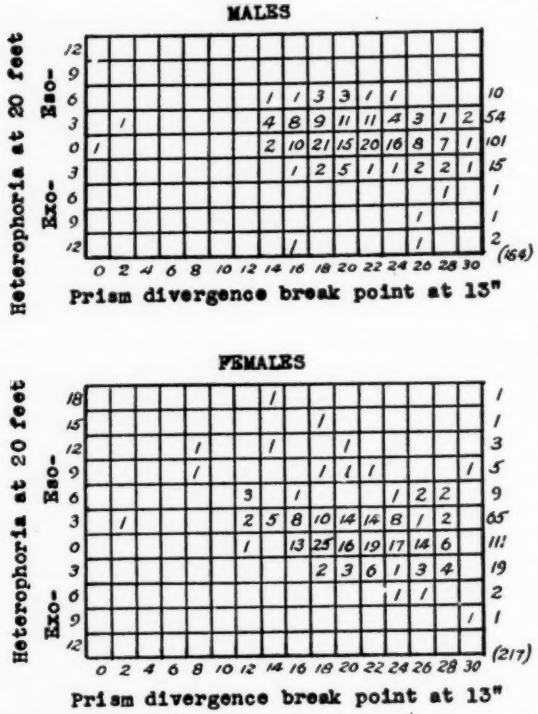

Fig. 4 (Scobee and Green). Relationship of heterophoria at 20 feet to prism divergence break point at 13 inches.

amounts of esophoria accompany lower amounts of prism divergence.

These correlations between lateral heterophoria and prism vergences at 20 feet are so weak as to prevent a satisfactory substitution of a heterophoria measurement for a prism vergence measurement. It appears that the two measurements, although correlated, are largely measures of different ocular functions.

On the other hand, the prism convergence break point does not correlate significantly with the point of prism divergence break at 20 feet ($r = +0.09$ for males, $r = +0.01$ for females).

At a testing distance of 13 inches, the amount of manifest lateral heterophoria is significantly correlated with the prism divergence break point even after removing the common effect of age on each function ($r = -0.18$ for males, and $r = -0.31$ for females). These coefficients imply that greater amounts of exophoria tend to accompany greater amounts of prism divergence and that greater amounts of esophoria tend to accompany lower amounts of prism divergence *at 13 inches.* This is shown in Figure 3.

A comparison of prism divergence at 13 inches with heterophoria at 20 feet shows that these two functions are related. The coefficients of correlation adjusted for age were -0.23 for males and -0.31 for females. The implication here is that greater amounts of exophoria at 20 feet tend to accompany greater amounts of prism divergence at 13 inches and that greater amounts of esophoria at 20 feet tend to accompany smaller amounts of prism divergence at 13 inches (fig. 4). This is another way of saying that if a patient is known to have a large amount of exophoria at 20 feet, one would expect a large amount of prism divergence at 13 inches; similarly, if a large amount of prism divergence at 13 inches is found, one expects to find a fairly marked exophoria at 20 feet.

Patients with much esophoria at 20 feet, on the other hand, usually have only small amounts of prism divergence at 13 inches; hence, a patient with poor prism divergence at 13 inches would, on the average, be expected to show fairly marked esophoria at 20 feet.

Patients with much esophoria at 20 feet, on the other hand, usually have only small amounts of prism divergence at 13 inches; hence, a patient with poor prism divergence at 13 inches would, on the average, be expected to show fairly marked esophoria at 20 feet.

The relationship is not strong enough to allow one measurement to be substituted

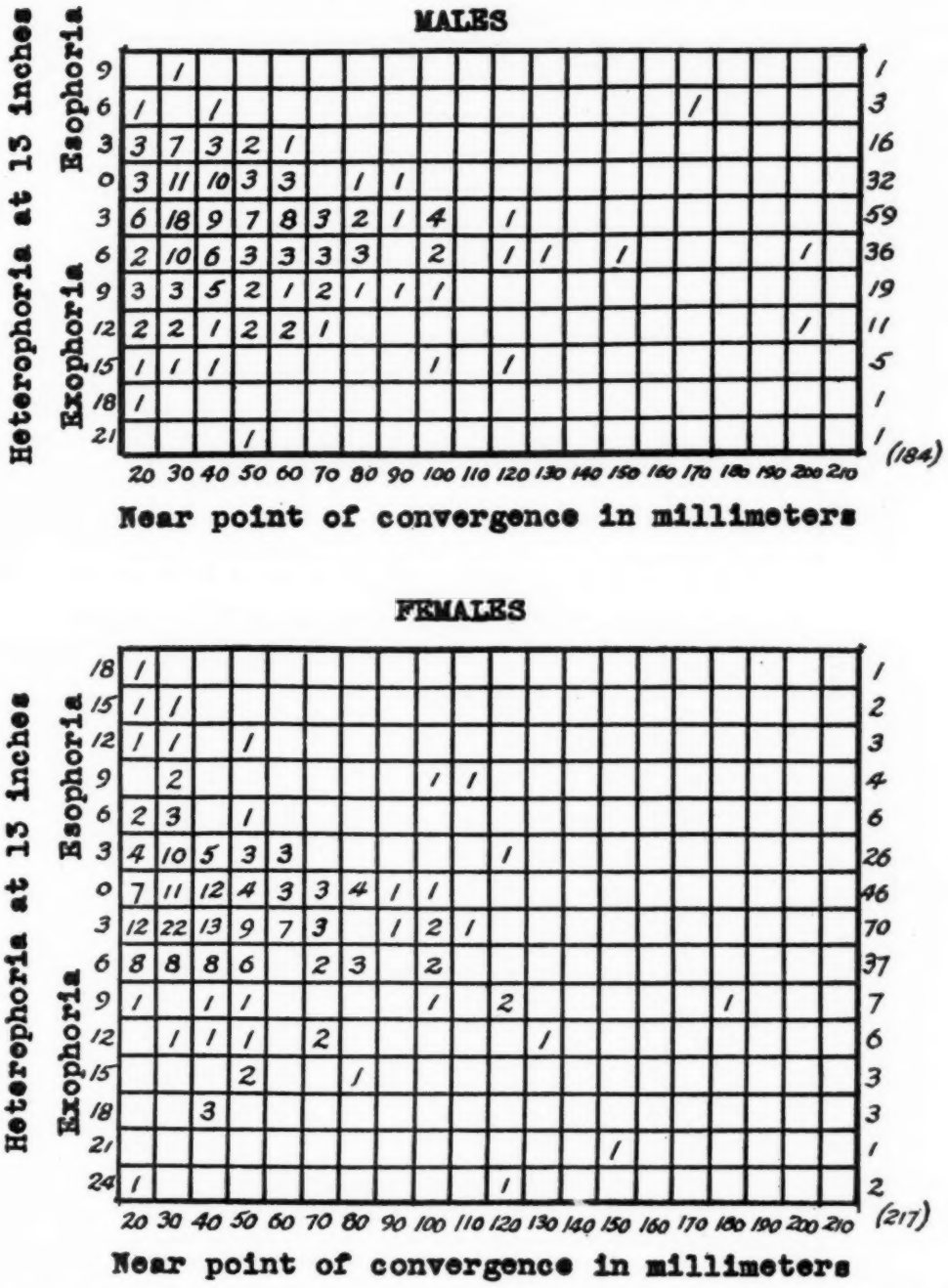

Fig. 5 (Scobee and Green). Relationship of near point of convergence to lateral heterophoria at 13 inches.

for the other, but is strong enough to enable the examiner who knows one measurement to make a guess at the other and not be too far wrong. It has been observed clinically that even large amounts of esophoria in patients with good prism divergence at 13 inches seem to be associated with no symptoms whatever; on the other hand, the patient with much esophoria and poor prism divergence at 13 inches will in all probability have many symptoms which will not be corrected by refraction alone. On clinical

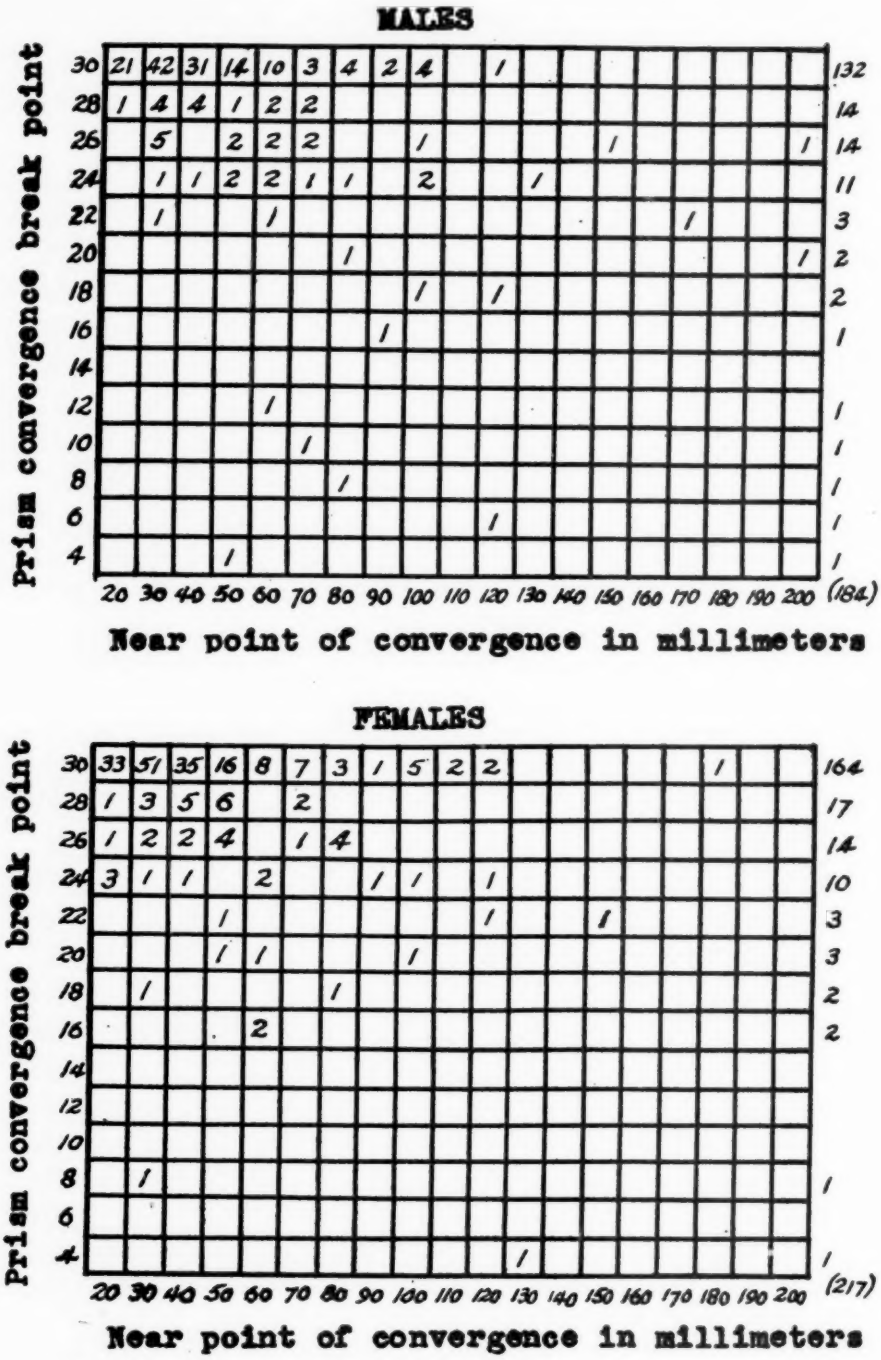

Fig. 6 (Scobee and Green). Relationship of near point of convergence with convergence break point at 13 inches.

grounds, it would seem that a knowledge of the prism divergence at 13 inches enables one to evaluate properly any esophoria which may be present.

Heterophoria and the near point of convergence. The near point of convergence is not correlated with the amount of manifest lateral heterophoria when the testing dis-

tance is 20 feet ($r = 0.00$ for males, $r = -0.08$ for females) but it is correlated with heterophoria tested at 13 inches with the effect of age removed ($r_a = -0.14$ for males, $r_a = -0.24$ for females). The relationship is such that greater amounts of exophoria tend to accompany greater measurements for the near point of convergence (fig. 5).

While it appears that a measurement of heterophoria at 13 inches and a measurement of the near point of convergence are to a slight extent measurements of the same ocular function, the similarity is not sufficient to justify an assertion that the two measurements are equivalent. It is quite obvious that the two measurements are measurements of largely different functions.

Prism vergences and the near point of convergence. As might be anticipated, the near point of convergence is correlated with the prism convergence break point (at least at the 20-foot testing distance and possibly also at the 13-inch distance, as shown in Figure 6), but it is not correlated with the prism divergence break point either at 20 feet or at 13 inches (table 1).

Discussion

The statement has been made that the data in this study show no significant relationship between age and heterophoria, prism vergence, and the near point of convergence. It is well known that some ocular functions, such as accommodation, change more or less systematically with age. It has been suspected that heterophoria also changes with age in the direction of exophoria. To discover whether or not such a change does occur, it would be desirable to study a group of subjects over a protracted period of time such as 20 or more years. No study of this sort has been made. For the time being, therefore, it is necessary to base a judgment about the effect of age on heterophoria on a sample of men and women of all ages. In our present sample, there is not sufficient relationship between age and heterophoria or vergence or the near point of convergence to enable one to predict the amount of change in the muscle balance of a patient from a knowledge of his age alone. Obviously a sample of this sort does not permit conclusions about changes in muscle balance in given individuals with changing age. Such a sample does allow the conclusion that there are no systematic changes with age affecting the population as a whole. If there are significant changes in muscle balance related to age, then these changes must be in different directions from individual to individual. This means, for example, that if the entire population had one prism diopter of esophoria at 20 feet at the age of 20, then at the age of 65, some might have 8 prism diopters of esophoria while others might have 7 prism diopters of exophoria; in other words, the change, if it occurs, is highly variable from one individual to the next. Certainly the *entire* population does not shift in the direction of exophoria with advancing years, as many have been led to suspect on the basis of observations on a few cases.

The near point of convergence is only slightly related to lateral heterophoria at 13 inches and to the prism convergence break point at 20 feet. The relationship is just barely of statistical significance and certainly is not strong enough to permit any clinical application.

There is a definite but not strong relationship between lateral heterophoria at 20 feet and the prism divergence break point at 13 inches. The relationship from the statistical standpoint is a weak although definite one. The addition of clinical observations, however, permits a clinical application of this relationship but only with certain limits. As was pointed out in the body of the paper, a knowledge of the prism divergence at 13 inches is a valuable adjunct to the proper evaluation of any esophoria present at either 20 feet or at 13 inches. Esophoria in the presence of good prism

divergence at 13 inches is not believed to be clinically important. Esophoria in a patient with poor prism divergence at 13 inches is often associated with severe symptoms which are not relieved, on the average, by correction of the refractive error, or even by orthoptics. It has been our clinical experience that patients with less than 12 diopters of prism divergence at 13 inches may be considered as having poor prism divergence and will usually have many asthenopic symptoms which are difficult or impossible to relieve by any known method of therapy at this time.

The question of the selection of an adequate battery of tests of muscle balance is and always has been a problem of particular interest to the armed forces. Tests which are highly correlated with each other are supposed to be measuring the same function and so may be substituted one for another. This means, for example, that if lateral heterophoria at 20 feet and prism convergence at 20 feet had a correlation coefficient of 1.0 or very close to it, both tests would, in all probability, be measuring the same function; that a knowledge of the results of one test would enable us to predict the results of the other; and that only one of the two tests need be included in any battery of tests for muscle balance.

On the other hand, tests that are not correlated at all are supposed to be measuring entirely different functions. If the correlation coefficient between two tests is 0.00, then we may reason that the tests are testing entirely different things and must be included in any battery of tests for muscle balance. This is the statistical approach to the comparison of various tests.

The primary difficulty in selecting a battery of tests for muscle balance is the fact that with the notable exception of the cover test, they are all almost entirely subjective. This means that they are all subject to different degrees of individual variation. A starting point would, therefore, be the comparison of various tests of heterophoria with the cover test and this has been done.[5] It is admittedly difficult to train inexperienced examiners in the proper performance and interpretation of the cover test. The armed forces have, therefore, selected the Maddox-rod test for heterophoria and it compares favorably with the cover test, at least at the 20-foot testing distance. At the 13-inch testing distance, either the Maddox-wing or the Thorington test are preferable from the standpoint of correlation with the cover test. So far, the armed forces have been content to omit any test of heterophoria at near and so the choice of a near test for heterophoria presents no problem at the present time.

The near point of convergence has been included in the battery of tests of muscle balance by the armed forces for a long time, although they appear to be about ready to drop it and apparently with good reason. It has a definite, although very slight, relationship to prism convergence at 20 feet and to lateral heterophoria at 13 inches. There are two convergence centers in the brain, one voluntary and the other involuntary. If involuntary convergence is lacking, voluntary convergence can be taught to the large majority of subjects in a very short time.[4] The near point of convergence is therefore a "trick" of crossing the eyes which can be learned in a short time; after it has been learned, the near point of convergence measurement is greatly improved although it seems obvious that there has been no improvement in the same individual's ability to perform close work over long periods of time. There are other and more reliable tests available which yield much of the desired information and hence the near point of convergence test can probably be eliminated from the test battery for muscle balance without impairing the efficacy of the battery significantly.

Like the near point of convergence, prism convergence can also be learned and is therefore so variable that there seems to be no

point in including it in the test battery at either 20 feet or 13 inches. It is not included at the present time.

Prism divergence, on the other hand, cannot be learned. No adequate demonstration of any divergence center has ever been made and prism divergence at the 13-inch distance to include prism divergence at 13 inches in any battery of tests of muscle balance. There seems to be no good reason to include prism divergence at 20 feet in such a battery.

Any decision about heterophoria tests at 13 inches is a difficult one in the light of our present knowledge. Certainly every ophthal-

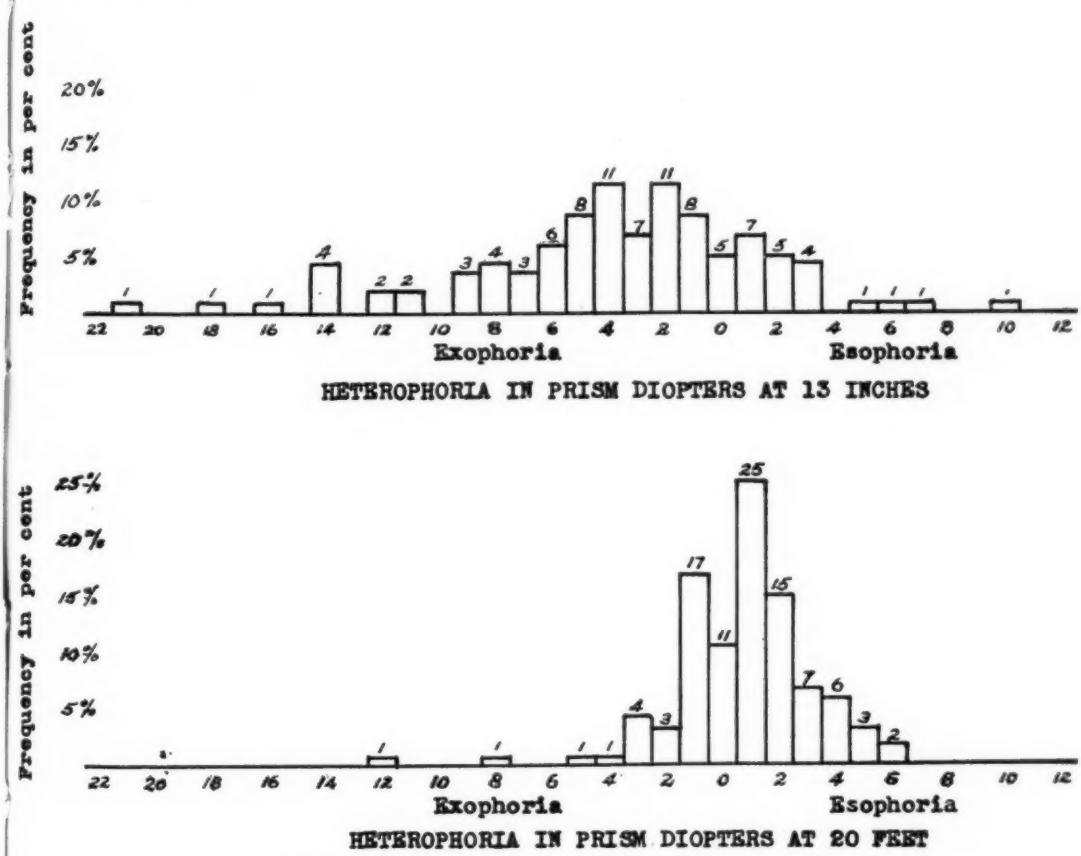

Fig. 7 (Scobee and Green). Distribution of lateral heterophoria for males 18 to 35 years of age inclusive.

appears to be a fairly reliable index of the ability of an individual to relax and give up convergence at the reading distance.[1, 5] It bears a definite, although slight relationship to heterophoria at both 20 feet and at 13 inches. Although the statistical evidence for its inclusion in any battery of tests for muscle balance is not impressive, the clinical evidence favoring its inclusion is much stronger. It would therefore seem advisable

mologist who tests muscle balance at all makes some determination of heterophoria at both 20 feet and at 13 inches. The mere fact of usage for a century or more is no evidence for inclusion in a test battery. Long usage would only indicate the weight of clinical experience seeming to favor the test. Imus[3] said that ". . . there is a small but definite relationship between the measures of near lateral phoria obtained by the

clinical method and the compensatory innervations measured at the same distance." This is substantially in agreement with our findings. Until more and better factual evidence is at hand, we are inclined to believe that a test of near heterophoria should be included in any battery of tests for muscle balance on the basis of clinical experience alone.

Selection of tests and test limits

The question arises as to what ocular functions shall be tested and what limits shall be established for "normal" ocular measurements. While such a question is of far more interest to the armed forces, since they desire to test large groups of individuals

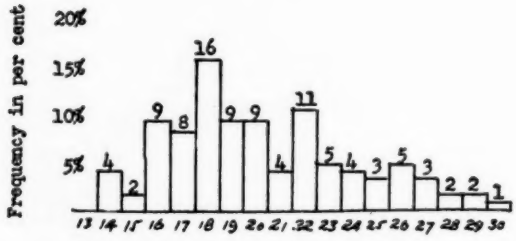

Fig. 8 (Scobee and Green). Distribution of prism divergence break point for males 18 to 35 years of age inclusive.

in certain age groups to be trained for specific tasks in time of war, than to the practicing ophthalmologist, nevertheless the question is of academic interest to all.

With the multitude of relatively unskilled examiners who must be called upon in time of war to test thousands of candidates, the armed forces are vitally interested in (a) the simplest examination which will yield reasonably reliable and significant results, and (b) a set of limits for the various tests employed which will adequately divide the "normals" from those who are likely to be unable to complete their training. Answers to these problems may be determined (1) by policy, or (2) by evidence.

Evidence would consist of data showing the various degrees of attainment in the performance of the task relative to the various readings for the test. Evidence of this sort is usually not available and can be obtained only by special studies. It is, therefore, frequently necessary to resort to a policy decision. When such a decision is made, it is desirable to know the proportion of individuals that will be classified as acceptable or not acceptable for various sets of limits.

For lateral heterophoria both at 20 feet and at 13 inches, Figure 7 shows the frequency distribution of an unselected sample of males in the age range of from 18 to 35 years inclusive. From this distribution it may be estimated that the acceptance limits of 4 prism diopters of exophoria to 4 prism diopters of esophoria at 20 feet will include about 92 percent of the population. If the limit for esophoria at 20 feet is increased to 5 prism diopters, then 95 percent of the population would be included.

With respect to lateral heterophoria at 13 inches, it may be seen that limits of 10 prism diopters of exophoria and 4 prism diopters of esophoria will include 85 percent of the population. In order to include 95 percent of the population, the limit on exophoria would have to be increased to 18 prism diopters, a figure which, by all clinical evidence, is known to be far too large for the comfortable binocular performance of sustained close work. On the basis of clinical evidence, 10 prism diopters of exophoria at 13 inches is a far more acceptable limit to be considered "normal."

Figure 8 shows the distribution for prism divergence at 13 inches of an unselected sample of males in the age range of from 18 to 35 years inclusive. From this distribution, it may be estimated that acceptance limits of not more than 27 prism diopters of divergence and not less than 14 prism diopters would include 95 percent of the population.

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DISCOLORATION OF THE EYELIDS FROM PROLONGED USE OF OINTMENTS CONTAINING MERCURY*

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Just a year ago, a 39-year-old woman came to my office with an unusual and rather striking discoloration of her eyelids. She had come for a routine examination but when questioned, she admitted that the discoloration was a source of considerable embarrassment to her; it had come on gradually over the last 10 years.

My first impression was that she had been using eye-shadow on her lower lids. There was a dirty gray color of the skin of both lower lids and of the lower 15 mm. of the upper lids; this latter was not apparent until she closed her eyes. The slitlamp showed a homogeneous gray cast to the skin; the pigmentation extended onto the lid margins as granules more brownish than gray. The bulbar conjunctivas, corneas, and lenses were normal. The color was very similar to that produced in argyrosis but the distribution was unusual, and there was no history of any silver preparations being used. Careful questioning finally brought out that because of granulated lids she had started rubbing yellow mercuric oxide on her lids every night and had continued it for about 23 years.

* Read at the 83rd annual meeting of the American Ophthalmological Society, Hot Springs, Virginia, June, 1947. From the Institute of Ophthalmology of the Presbyterian Hospital, New York.

REPORTS IN LITERATURE

A search of the literature gave nothing about such discoloration of the eyes from yellow oxide. In 1922, however, Goeckermann[1] described a woman whose eyelids, nasolabial folds, and chin were a brownish gray or slate color. It was attributed to a face cream containing bismuth and mercury. His second patient showing similar but less marked pigmentation, had used a cream containing only mild mercurous chloride. He pointed out that mercury in contact with alkaline secretions yields a blackish pigment of mercury oxide. This reaction was reversible by a dilute acid. Both of his patients improved on using a 2-percent acetic acid and did still better on a 1-percent aqueous solution of potassium cyanide, but both chemicals irritated the skin. Since mercury was freely used in creams, he concluded that the skins of his two patients were peculiar. He was able to demonstrate that the secretions of one were alkaline. The same author reported 13 more cases in 1925.[2] All were typical. A biopsy showed pigment granules in all layers of the skin and subcutis. He was not able to demonstrate mercury chemically but the granules were removed entirely by a compound solution of iodine.

The only other dermatologic report found was by Hollander and Baer, in 1929.[3] They

described a woman whose entire face was a dirty grayish black. She had used a face cream daily for 15 years. Mercury was demonstrated in the skin by an electromicroqualitative method. They rubbed the skin briskly with tincture of iodine to form soluble mercuric iodide, then alcohol to dissolve the new compound. Her skin improved but she did not complete the treatment.

I was unable to get a biopsy in my case, but the history was so definite that there seemed to be no doubt as to the relationship between the discoloration and the yellow oxide. As the treatments just described were considered too drastic for the eyelids, no treatment was attempted. The mercury was stopped and plain vaseline was suggested in its place. Six months later there was definite fading and the patient volunteered that people no longer commented about her lids. Eleven months after the mercury was discontinued, the patient is happy about her condition but the gray color, while fainter, is still fairly definite.

In the November, 1946, number of the *British Journal of Ophthalmology*, Abramowicz[4] gave the first report that I have been able to find of a case very similar to the one that I have described. The patient was a woman, aged 57 years, who had used white precipitate ointment of 6.66 percent nearly every night from the age of 16 years, that is, for 41 years, for blepharitis. The skin of her eyelids was bluish gray. Dark pigment granules were found in the bulbar conjunctiva, especially near the cornea, with preferential distribution around the perivascular lymph vessels. In the periphery of the cornea, in the region of Descemet's membrane, a discoloration varying from greenish gray to a bluish gray was seen. A yellowish-brown, lusterless opacity occupied the pupillary area of the lens.

I will return to the discussion of this case after describing very briefly four patients I have seen subsequently. This report by Abramowicz confirmed my belief that mercury had been responsible for the discoloration and increased my interest in the condition. I feel certain that without my first case, I would have missed the later ones, because the pigmentation, while definite, was subtle.

Reports of similar cases

My second patient was a druggist, aged about 55 years, who complained that his eyes were always irritated and tearing and that the lids were purple. He had used 1-percent yellow oxide for at least 10 years. There was a faint gray, slightly greasy appearance of his lids, most marked at the upper borders of the upper tarsi.

The third case was a woman, aged about 30 years. She had had many styes and had massaged her lids nightly with 2-percent yellow oxide for four years. There was faint but definite discoloration of her lower lids.

The fourth case was a woman, aged 40 years. She had used various ointments since she had trachoma 22 years previously. She was certain that yellow oxide had been one of them, but for the last four years she had been using 3-percent ammoniated mercury. There was a slight gray cast to the skin of the lower lids and the upper lid margins looked faintly blue.

None of these three persons had complained of the discoloration, nor were they actually aware of it. Yet, in each instance, it was definite enough for me to suspect mercury and to elicit the histories that have been given. While not a definite cosmetic blemish, the color was certainly unpleasant and might eventually have become embarrassingly conspicuous.

I am indebted to Dr. DeVoe for the fifth and last patient, a 67-year-old man. He is the only one who consulted an oculist because of the pigmentation of his lids. They had become red and inflamed so he had massaged them almost every night for 20 years with yellow oxide. The typical dirty gray

color involved both lower lids and the lower one centimeter of the upper lids.

Discussion

These five cases, although varying in degree of pigmentation, showed essentially the same picture. Only in the first and most marked instance was the pigmentation of the lid margins definite. None showed any pigmentation of the conjunctiva that could be attributed to mercury. There were no changes in the corneas or lenses. The much more extensive involvement in the case of Abramowicz should be easily explained because a much stronger percentage of mercury was used for a considerably longer period.

Many of the members of this society will remember the excellent report given by Atkinson[5] five years ago, in which he described for the first time a brownish reflex of the anterior lens capsule in people who had worked for long periods with mercury. This was thought to be produced by mercury vapor. That Abramowicz found the same change in the lens, from external application, is of particular interest. In four of Atkinson's cases with chronic mercurialism, the skin of the face presented a gray appearance.

Use of mercuric ointments

Yellow mercuric oxide first appeared in the English ophthalmic literature in 1866, when Pagenstecher[6] described its use for phlyctenular conjunctivitis and corneitis. It had been listed in the German pharmacopeia for 10 years previously and had gained "many ardent supporters" in that country. Since that first article, there has been scarcely any mention of it in periodicals, yet its use spread rapidly as shown by a review of textbooks. It soon became the most widely used ophthalmic ointment and has held this lead up to the present even though it is prescribed much less frequently by ophthalmologists today.[7] This decline in popularity with oculists is undoubtedly due to an appreciation of its relative ineffectiveness and the influx of new ointments such as the sulfonamides and penicillin.

Although no figures are available on the total annual consumption of yellow mercuric oxide in this country, the best evidence indicates that the amount is immense, possibly in the neighborhood of 100,000 ounces. This is largely due to the efforts of the druggists of the country, who prescribe and dispense the drug with great freedom for a wide variety of eye complaints.

Ammoniated mercury ointment apparently antedated yellow oxide in ophthalmic use. The earliest reference that I have been able to find was in the French *Annales d'oculistique*[8] for 1856, when it was called white precipitate. It has enjoyed continued popularity since that time but has never approached yellow oxide in the amount used. This is hard to understand because, for a long time, it has been generally known that the ammoniated mercury is equally or more effective therapeutically and much less irritating. In fact the great and lasting popularity of yellow oxide is a mystery that I have been unable to solve.

The wide use of mercury in ophthalmic ointments over the last 80 or 90 years has been discussed to emphasize how remarkable it is that this picture of discoloration of the eyelids has not been described before. I am convinced that we have all been seeing mild forms of it for many years. Evidence of this is the fact that, once I was aware of it, I found four more instances in 10 months.

Two other points present themselves for speculation. One is the question of individual susceptibility. This undoubtedly is a factor but it will be established with difficulty because of the very gradual onset and the lack of figures on the actual use of the drug. The other question is that of prescribing other mercury preparations, such as oxycyanide of mercury as eye drops. This experience has made me cautious about ordering them for indefinite use.

Conclusion

Five cases have been presented which show a characteristic dirty gray discoloration of the skin of the eyelids. These cases have one point in common; namely, daily use of an ophthalmic ointment containing mercury (yellow oxide or ammoniated) over a prolonged period, four years being the shortest. There appears to be a direct etiologic relationship between the mercury and the pigmentation. While no treatment is suggested, the color fades slowly on discontinuing the ointment.

30 West 59th Street (19).

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Historical Miniature

Hemianopsia. Although the Hippokratic writers neither knew nor measured the extent of the visual field as the later Greeks did, the phenomenon of half vision associated with cerebral disease did not escape their notice. In the *Second Book on Diseases,* it is noted that, in a patient with a disease of the head associated with somnolence and frequent urination, the headache ceased after 20 days. "And when he looked at something the vision escaped him and he was aware of seeing only one half of persons."

Hirschberg in *Graefe-Saemisch Handbuch,* v. 12.

THE USE OF BUCCAL MUCOSA IN THE RESTORATION OF THE ORBITAL SOCKET*

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INTRODUCTION

Restoration of the orbital socket to permit the wearing of a prosthesis is a necessary and important procedure in ophthalmic surgery. Although it is true that complete obliteration of the socket is relatively rare, partial obliteration is frequent, and only slight degrees of contraction may prevent the socket from accommodating a prosthesis. The lower cul-de-sac appears to be far more vulnerable to injury than the base of the socket or the upper cul-de-sac; therefore, it is most often deformities of this part that must be repaired. This unequal distribution of the effects of injury is emphasized by Maxwell,[1] whose ingenious operation was devised primarily to restore the lower cul-de-sac.

The recent war contributed to the problem. Many soldiers with contracted sockets could be counted among the 1,200 who were totally blinded and the thousands who lost one eye from battle wounds or training accidents. In addition to these, there was a fairly large group of inductees with only one eye, a number of whom had deformities which had prevented them from wearing a prosthesis.

The majority of these patients with contracted sockets received definitive treatment at the eye centers established throughout the United States by the Office of The Surgeon General. One of the largest of these was at Valley Forge General Hospital where I was stationed during a considerable period of the war. Here my associates and I had an unusual opportunity to apply the reconstructive procedures advocated for alleviation of contracted sockets. Even the totally blind soldiers were insistent that partially or completely obliterated sockets be restored in order that they might wear artificial eyes. They were not only willing but anxious to undergo any operative procedures that would result in giving them a normal outward appearance, even though their sight was gone. The technique which we found most satisfactory included the employment of grafts of buccal mucosa.

EARLY ATTEMPTS AT RESTORATION OF SOCKET

Earlier attempts at restoration of the orbital socket were by means of pedicle skin grafts or free skin grafts, and the surgeons who first advocated these methods made use of the full thickness of the skin. We are indebted to Reverdin,[2] Ollier,[3] Thiersch,[4] and Wolfe,[5] all more or less contemporaries, for demonstrating that pedunculated skin flaps are not essential to the vitality of the graft. Wolfe[6] conclusively demonstrated that ". . . the cause of non-success in transplantation was the areolar tissue underneath, and that, if we could transplant a skin flap free of that subjacent tissue, we should secure its adhesion and incorporation." Full thickness skin grafts were employed by Weeks,[7] Morax,[8] and others. Verhoeff[9] recommended the use of a Thiersch graft employed in a manner similar to that later advocated by Wheeler,[10] who utilized epidermic grafts. Wheeler objected to the use of the name Thiersch in connection with the epidermic graft, for the graft which Thiersch employed was dermo-epidermic. Wheeler, however, was not the first to use the epidermic graft; he had been preceded by Esser[11] who had employed it in the form of an "epithelial inlay" as a means of enlarging the orbital socket. Wheeler laid emphasis on the point that the ideal graft for

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relining the socket was epidermis only, free from layers of true skin. While this technique was eminently successful in Wheeler's hands, one is impressed by the large number who failed to attain the desired results using the operative measures he advocated. In consequence, there are few ophthalmic surgeons who observe the technique outlined by Wheeler either in dissection of the socket or in cutting the graft.

Heterogeneous transplantations

In 1872, J. R. Wolfe of Glasgow first transplanted conjunctiva from the rabbit to the human eye for the successful cure of symblepharon. This operation was soon adopted by surgeons of various countries. In a subsequent report in 1883, Wolfe[6] stated that Noyes of New York had been the first American surgeon to apply this operation to reconstruct the sac so that the patient might wear an artificial eye, when the natural cavity had become contracted. Cohn of Breslau, however, had previously made use of the procedure to achieve a similiar result.

In connection with the Wolfe operation, the following statement appeared in the *British Medical Journal* of August 20, 1888: "In showing the patient, Doctor Wolfe commented on the fact that it was nearly 15 years since he introduced this operation, and in spite of the fact that the rabbit's conjunctiva gave perfect results, efforts to transplant mucous membrane from the human subject, from the mouth and even the vagina, were being made."

Early use of mucous membrane

Van Millingen[12] must be given credit for the first operative procedure which included transplanting a strip of mucous membrane from the inner surface of the lower lip to the margin and under surface of the upper lid for the cure of trichiasis. He first described his operation in an article, in 1880, reporting the result he had obtained during the preceding three years. After several experiments, including grafting with mucous membrane from the mouth of the rabbit to replace conjunctiva, he gave preference to mucous membrane from the patient's lip. Hugo Wolff[13] of Berlin reported, in 1905, that in his operation for symblepharon he was using mucous membrane from the patient's mouth for grafting in order to form a lasting conjunctival fold.

Denig[14] began to experiment with grafts of mucous membrane from the mouth in cases of trachomatous pannus, in 1910. The favorable results obtained induced him to use it as a curative measure following chemical burns of the cornea and limbus, and he later applied it to other corneal conditions. His report was based on the results of such grafts in 150 patients.

Influence of World War I

The influence of World War I is reflected in the publications on ophthalmic surgery during the following decade. Because of the great increase in deforming injuries to the orbital structures, interest in reconstructive surgery was stimulated, just as it has been during the recent war. In 1918, in discussing Henderson's[15] paper on suture operations for contracted socket, Story referred to the procedure that he himself employed. In the case of moderately contracted sockets, where operation was possible, he transplanted mucous membrane instead of skin, and found it to be fairly successful. The next year Greene, in his discussion of Cruise's[16] paper on an operation for contracted sockets, expressed the logical conclusion that since there was mucous membrane lining in the socket it was well to follow it up with more mucous membrane. He had obtained good results by taking a large flap of mucous membrane from the inside of the mouth to replace the lost conjunctiva and inserted a glass ball to maintain contact between the graft and the underlying tissues.

Further reports in literature

In 1920, Majewski[17] called attention to the

fact that either buccal or vaginal mucosa could be utilized in the repair of contracted sockets. In an article on the subject, written about the same time, Benoit[18] mentioned that Gallemarts used vaginal mucous membrane, while Ssapiejko preferred mucous membrane taken from the lips. He also called attention to the unsatisfactory results of heteroplastic grafts.

Karelus,[19] in 1924, distinguished three classes of surgical procedures for reconstruction of the orbit after total obliteration. The first of these included the different methods of covering the prepared orbit with mucous membrane. He stated that heteroplastic grafts, the rabbit's conjunctiva, for example, must be abandoned, and trial be made of transplanting human mucous membrane from the buccal or the vaginal mucosa. To the best of his knowledge Stellwag (1889) had been the first to describe this procedure.

Gillies and Kilner,[20] in discussing the treatment of symblepharon, in 1929, reported one case in which the cornea had not been damaged. Mucous membrane from the inner surface of the lower lip was employed, and the graft was applied in a manner precisely similar to the Thiersch grafts in earlier cases. They were of the opinion that this form of grafting had many advantages to recommend it, and that it would, in selected cases, entirely supersede the Thiersch graft. In a later discussion Kilner[21] stated that the difficulty in these cases was to insure proper pressure dressing of the grafts.

Clay and Baird[22] (1936) recommended mucous membrane from the prepuce and labia minora as an ideal substitute for conjunctival tissue. They found that not only was there enough tissue available for complete restoration of the socket, but also it had none of the objectionable features of ordinary skin grafts. They pointed out that skin grafts "are most unsatisfactory to the patient in that they are uncomfortable and unsightly, desquamation is always present, and there is most frequently a disagreeable odor."

Hughes[23] offered two objections to the use of mucous membrane from other parts of the body as a substitute for conjunctiva; the first being that the secretion was thick and copious, and the second, that it was difficult to obtain a sufficiently large area of mucous membrane.

Spaeth,[24] in discussing the use of mucous membrane in ophthalmic surgery, made the following statement: "There is but one defect for which these grafts may be used; namely, for the correction of a conjunctival defect, and that in the presence of an intact and healthy eyeball." He pointed out that one need allow for little if any shrinkage in the mucous membrane graft.

Whalman[25] advocated a wider usefulness for these grafts, stating, "Whenever it becomes necessary to supplement or supplant conjunctival tissue for any reason whatever, nothing serves better than a graft of mucous membrane from the mouth. . . . Skin exfoliates, becomes rough and irritating—mucous membrane remains smooth and soft."

DeVoe[26] described the technique he had developed to restore the lower cul-de-sac by means of buccal mucosa. He stated that sockets lined with these mucous membranes had been found to be most satisfactory; furthermore, they were free from objectionable odor and discharge. He considered it impossible to procure enough mucous membrane to line a socket completely, but recognized that a socket lined partially with mucous membrane and partially with skin was extremely annoying to the patient, because the discharge was profuse and ill smelling.

Marcks and Zugsmith[27] recommended the inside of the lower lip as an ideal donor area for mucous membrane for restoration of the lower cul-de-sac. They could see no contraindication to combining skin and mucous membrane.

Stallard,[28] on the other hand, concurred with the widely held opinion that combinations of mucosal and epidermal grafts in the same socket are unsatisfactory. He regarded mucosa from cheeks or lower lip as the best material for orbital grafts, but he stated that when areas larger than 1.5 cm. had to be covered epidermis was the only possible material.

Fox[29] stated that the ideal lining for a socket was mucous membrane and that the buccal membrane could be used if large grafts were needed. Mackenzie[30] also agreed that the ideal graft for lining the orbit was mucous membrane. According to him, the choice of donor sites varied depending on the sex of the patient. In the male he listed donor sites in the following order of preference: (1) Mucous membrane of the mouth; (2) mucous membrane of the prepuce; (3) Rectal mucosa; and (4) nasal mucosa.

He considered the order of preference for donor sites in the female to be: (1) Vaginal mucous membrane; (2) oral mucous membrane; (3) rectal mucosa; and (4) nasal mucosa.

Surgical treatment of contracted socket

Since sufficient mucous membrane, even for essentially complete restoration of a socket, is available from the mouth alone, to take mucous membrane from areas so much less accessible would seem to me to be unnecessary and might even subject the patient to possible untoward sequelae.

Like most ophthalmic surgeons, I had limited the use of grafts of mucous membrane to the cure of symblepharon, but had not explored its possibilities in more extensive procedures. Confronted by the great number of patients with contracted sockets at Valley Forge, I became aware that a dependable method of reducing this deformity was imperative. The disappointing consequences of skin transplants for partial restoration of the socket prompted me to utilize buccal mucosa, which most nearly resembles the lost conjunctiva, and which had been used with success by ophthalmic surgeons during World War I. The procedure found to be most effective in the surgical treatment of contracted socket was carried out in the following manner.

Preoperative procedure

Preliminary to operation it is necessary to eliminate all pus-producing areas in the region of the socket, allowing sufficient time to insure an operative field free from infection and well healed. It is equally important that the mouth from which the graft is taken be healthy; such conditions as pyorrhea affect the vitality of the transplanted tissue.

Operative procedure

The operation can be carried out under either local or general anesthesia. If there is a considerable loss of conjunctiva, intratracheal anesthesia is desirable. With the patient anesthetized, the entire face is prepared with soap and water, followed by tincture of zephiran. A packing of gauze, squeezed out of an aqueous (1:5,000) solution of zephiran, is placed in the mouth, where it remains while the dissection of the socket is carried out.

The technique as described by Wheeler[10] is closely adhered to in preparing the bed to receive the graft. The plane of dissection must be kept superficial so that the reconstructed lid will contain nothing but lid tissue. The dissection should be carried to a point beyond the orbital margin below and temporally. Nasally it should extend to the anterior crest of the lacrimal groove and to the orbital margin above it. The caruncle should always be preserved unless it already has been destroyed. Both temporally and nasally the dissection should extend beyond the limits of the palpebral fissure. If the levator is present every effort should be made not to injure it in dissecting the upper cul-de-sac. The dissection above should extend behind the orbital margin and need not

be carried all the way to the roof of the orbit, since it is not necessary that the upper cul-de-sac be deep. Bleeding points should be controlled by pressure if possible.

All cicatricial and granulation tissue must be excised in preparing the bed for the graft, for, as Wheeler[10] pointed out, contraction of the tissue beneath the graft results in reduction of the size of the socket. It is also imperative to remove any skin and scar tissue remaining from earlier attempts to reline the socket. External canthotomy should be performed if it will facilitate the dissection; but this is seldom necessary when only one cul-de-sac is to be restored.

After the bed for the graft is prepared, the upper and lower lips are retracted by means of towel clamps, and the malar buccal mucosa is put on the stretch. The submucosa is first infiltrated with 1-percent novocaine, if local anesthesia is used, and with physiologic solution of sodium chloride, if general anesthesia is used. Next, the extent of the graft is outlined with a sharp scalpel taking care to avoid inclusion of the opening of Stenson's duct. Caution must be exercised in dissecting the graft free, so that it will not be traumatized. After it is taken up, all submucous tissue is excised from its under surface with scissors. The wound in the buccal mucosa is closed with mattress sutures of heavy silk.

The graft is sutured into its new bed with interrupted fine silk. Three or four double-armed, 4-0 silk sutures are threaded through plates of rubber tubing and then through the graft in the depths of the new fornix. Below and temporally, these sutures are passed through the periosteum of the orbital margin in a manner similar to that described by Weeks.[7] In the upper cul-de-sac the sutures should be passed through the periosteum and brought out just beneath the brow. They are finally brought out onto the skin of the cheek or brow and tied over rubber plates. This gives assurance that the graft is anchored in the fornices and cannot retract. The socket is packed with one-quarter inch vaseline gauze, instead of employing the stent which has been in general use.

Postoperative procedure

We found that uniform pressure can be far more effectively obtained by packing than by the stent. Firm packing of the socket causes the graft to spread out more evenly and establishes more uniform contact between the raw surfaces. A pressure dressing is applied and left in position for a period of from 5 to 7 days. At that time the packing is removed, but the socket is repacked firmly, and a pressure dressing reapplied. The dressing is changed every three days until at the end of two weeks the graft is well healed, and if other surgical procedures are necessary, they may be undertaken. The wound in the mouth heals rapidly, and leaves no deformity.

When there is complete obliteration of the socket, the restoration has usually been carried out in two stages, one cul-de-sac being relined with buccal mucosa at each stage. A single graft of buccal mucosa cannot be obtained that is large enough to reline a socket completely; grafts from both cheeks are required. There should be no objection, however, to taking a graft from each side at one operation. The primary advantage of such a procedure would be the elimination of prolonged hospitalization.

When the socket is restored and healing has taken place, an acrylic conformer should be placed in the socket to maintain its shape.

Case reports

I shall present several illustrative cases in which I have performed buccal mucosal transplants for the correction of contracted sockets. Some of these patients were soldiers on my service at Valley Forge, others have been operated on since my return to civilian practice. All have been followed for periods of weeks, some for months, after operation. In no instance has there been a significant degree of contracture of the socket.

Case 1. A youth, 18 years of age, had been

born with no apparent eye in the left socket. At the age of four years, two unsuccessful attempts had been made to enlarge the socket by means of skin grafts in order that he might wear a prosthesis. When we first saw him, the left upper lid appeared shorter than the right. No eye could be seen in the left socket and there was very limited motility at the base. The upper cul-de-sac showed rather marked contraction toward the outer canthus where it was lined with skin. The only conjunctiva present was that lining the upper and lower tarsal surfaces. The external canthus was round with continuation of the graft from the floor of the socket onto the skin over the outer orbital margin. There was marked eversion of the lower lid.

In August, 1946, the skin graft in the base of the left socket was excised and dissection was carried to the lower orbital margin throughout its extent and to a point beyond the midline of the temporal orbital margin. A mucous membrane graft was taken from the inner surface of the left cheek and sutured into position in the denuded area. The socket was packed with vaseline gauze and a pressure dressing was applied. The mucosal wound was closed with mattress sutures of heavy silk. All sutures were removed at the end of 16 days. The graft was healthy and in good condition.

A month from the time of the original operation a second stage of reconstruction of the socket was carried out. The remainder of the skin from the base of the socket was excised and the dissection was carried well into the upper fornix. It was also carried temporally to a point beyond the upper temporal orbital margin. A mucosal graft was taken from the inside of the right cheek and sutured into position in the usual manner and the socket was packed with vaseline gauze and a pressure dressing was applied. Five weeks later an external canthoplasty was performed. A month following this, the patient could be fitted with a permanent prosthesis, which he has worn since that time with no difficulty.

Case 2. A 19-year-old soldier was admitted to Valley Forge General Hospital in February, 1944, with a diagnosis of contracture of the left socket. The left eye had been enucleated following an infection when he was six years of age, and because of a contracture of the socket he had been unable to wear a prosthesis. A few weeks following the enucleation, an unsuccessful attempt had been made to enlarge the left socket by a skin graft. In September, 1943, another attempt to restore the socket failed.

On examination of the left socket, externally, the lids appeared normal. Lining the inside of the lower lid, and extending almost to the margin, was an epithelial graft with some hair growing from it. There were adhesions between the base of the socket and the upper margin of the tarsus in the temporal half of the upper fornix. Nasal to this was an opening which was lined with skin extending toward the upper fornix for about 1 cm. The floor of the shallow socket and the tarsus of the upper lid on the nasal side were adherent.

At operation, performed in April, 1944, an incision was made on the inside of the lower lid throughout its entire length just anterior to the skin graft. Dissection was carried down to the inferior orbital margin throughout its extent. All scar tissue was removed along with the skin which lined the lower lid and the floor of the socket. A mucous membrane graft was taken from the buccal mucous membrane on the inside of the right cheek, and sutured in position with fine interrupted silk, so as to reline the newly formed lower cul-de-sac. Three mattress sutures were passed through the periosteum of the orbital margin, coming out on the skin of the cheek below this point. The socket was packed with vaseline gauze and a firm pressure dressing was applied.

In June, 1944, dissection of the upper cul-de-sac and the remainder of the floor of the socket was carried out, all skin and connective tissue having been excised. A mucous membrane graft was taken from the left

cheek and sutured in position, as in the lower fornix. The usual packings and pressure dressings were applied.

Three weeks later an acrylic conformer was substituted for the vaseline gauze. At the end of six weeks, an acrylic prosthesis was fitted to the socket, and the patient was returned to duty.

Case 3. The right eye of a soldier, 29 years of age, had been severely injured in action in Sicily in July, 1943. An enucleation was performed on the day of the injury. He had been unable to wear a prosthesis because of damage to the lower lid.

Examination revealed the left eye to be normal. The middle one third of the right lower lid was missing. There was a fibrous band extending from the lower orbital margin toward the base of the socket. The lower cul-de-sac appeared normal toward either canthus.

Following reconstruction of the right lower lid, the lower fornix was so constricted that a prosthesis could not be worn. The lower cul-de-sac was dissected to a point beyond the inferior orbital margin through its central two thirds. A buccal mucosal graft was taken from the right cheek and sutured into position as previously described. The socket was packed with vaseline gauze, and a pressure dressing was applied.

Six weeks following this operation the patient was given a permanent prosthesis.

Case 4. A soldier, 19 years of age, was admitted to Valley Forge General Hospital in June, 1944, with a diagnosis of contraction of the right orbital socket. When he was nine years of age, the right eye had been injured by scissors and enucleation was performed two weeks later. He had never been able to wear a prosthesis.

Examination revealed anophthalmus of the right eye, with contraction of the socket and a tendency for eversion of the lower lid. There were scars at the base of the socket, particularly toward the nasal side, where adhesions connected the caruncle with the conjunctiva, extending to both upper and lower fornices. As a result of these adhesions the upper tarsus had been thrown into folds. The base of the socket and the cul-de-sac toward the temporal side appeared to be adequate both above and below. All scar tissue in the socket was removed and the dissection was carried into both the upper and lower fornices of the caruncle. A buccal mucosal graft was taken from the left cheek and sutured into the denuded area in the usual manner. The socket was then packed with vaseline gauze, and a pressure dressing was applied.

This patient was later fitted with a permanent prosthesis and returned to duty.

Case 5. A soldier, 38 years of age, was admitted to Valley Forge General Hospital with a diagnosis of contracted left socket. The eye had been removed following an operation for cataract in infancy.

Examination revealed the socket to be small, the lower fornix very shallow with a band of scar tissue extending from the fornix to the lower lid margin. A web of scar tissue extending 1 cm. temporally from the inner canthus adhered to the palpebral conjunctiva, both upper and lower lids, and the conjunctiva of the base of the socket. No implant could be palpated in the socket.

In July, 1944, all the scar tissue and adhesions in the left socket were severed and excised, including the nasal one third of the floor of the socket and the lower cul-de-sac. A mucous membrane graft from the inside of the left cheek was placed over this denuded area, being sutured in position in the usual manner. The socket was then packed with vaseline gauze and pressure dressing applied.

This patient was later fitted with a prosthesis and discharged to duty.

Conclusion

It is now 70 years since buccal mucosa was first employed to replace conjunctiva. That so few ophthalmic surgeons have taken advantage of this relatively simple procedure

is surprising, in view of the excellent results obtained. I am sure that no one who has utilized both skin and buccal mucosa as substitutes for conjunctiva would insist that skin makes a more desirable lining for the orbital socket. The only objection raised by those who used buccal mucosa is that there is not a sufficient amount available for complete restoration of the socket. The mucosal lining of both cheeks and the lower lip furnish enough mucosa to reline an entire socket. There are many features that make buccal mucosa desirable as a substitute for conjunctiva. It is easily accessible, clean, and free from odor and its removal leaves no residual deformity at the donor site. It remains moist and smooth in its new location. There is little tendency for the graft to shrink, if preliminary dissection has been properly carried out. To be sure, the secretion is somewhat thicker than that from the conjunctiva, but it is not copious and produces a minimum of annoyance to the patient.

It is a well-known fact that skin remains skin regardless of its location, and buccal mucosa also retains its characteristics in its new location in the orbital socket. Nonetheless, there is no tissue which more closely resembles conjunctiva; the differences between the two are trifling and the fact remains that buccal mucosa is a far better substitute for conjunctiva than skin.

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ANGIOSARCOMA OF THE ORBIT*

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Angiosarcoma of the orbit is a very rare tumor. The term "angiosarcoma" was first employed by Kolaczek[1] to designate all tumors originating from blood and lymph vessels. This loosely applied term has led to various interpretations by individual investigators of histologic findings. According to Karsner[2] the term is applied to a sarcoma provided with numerous, wide, vascular spaces. Mallory[3] feels that the term is permissible only when the rate of growth is so rapid that cell differentiation does not take place and an exact diagnosis is impossible. McFarland[4] restricts the term to malignant tumors characterized by initial and continuous new formation of blood vessels associated with an excessive number of cells resembling those of sarcoma. Many pathologists use the terms "angioendothelioma" and "angiosarcoma" interchangeably; others employ "angiosarcoma" for neoplasms in which the blood vessel as a whole is the neoplastic unit and reserve "endothelioma" for tumors which are the result of neoplastic proliferation of the endothelium alone. Ewing[5] has described the histogenesis of angiosarcomas, although MacCallum[6] does not believe that there is sufficient descriptive explanation to warrant the use of a special name. Since the establishment of a general *Registry of Bone Sarcomas* by Codman,[7, 8] in 1920, one of the most significant papers in regard to pathology and histogenesis is that published by Kolodny[9] which describes the microscopic features of angiosarcoma and discusses its confusion with angioendothelioma and angioma. Recently Schmidt[10] has described the pathologic connecting link between hemangioma and angiosarcoma. There is, however, still a great lack of material regarding the etiology and histogenesis of this disease. It is evident from a study of the literature that there is much controversy about the histologic pathology of angiosarcoma. As Kolodny remarks, such discrepancy of views and opinions is only natural when one realizes that the tumor is exceedingly rare.

In citing Birch-Hirschfeld as an authority on diseases of the orbit, Meisenbach[11] discusses the clinical and anatomic findings of hemangioma of the orbit, but makes no mention of angiosarcoma.

A thorough review of available literature reveals that, in 1909, Parker[12] presented a case of angiosarcoma of the orbit in a little girl, aged 18 months. However, he did not describe the histopathology of this case.

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The same year Goldberg[13] presented a case which proved to be angiosarcoma of the orbit. The growth appeared in the orbit several months after an enucleation had been performed. There had been no microscopic examination of the enucleated eye, and the diagnosis was made when a small pedunculated growth, which had the appearance of a hematoma springing from the conjunctiva of the socket, was removed at the second operation.

REPORT OF CASE

This patient, a white girl, aged 11 years, was first seen on September 15, 1945. Her

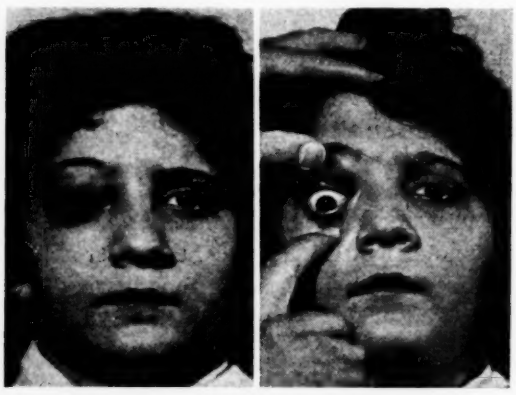

Fig. 1 (Carelli and Cangelosi). Appearance of the right eye preoperatively.

mother stated that her daughter was perfectly well until the last of July, 1945, when a slight swelling occurred over the right upper eyelid. There was a gradual increase in the swelling, but nothing peculiar about the eyeball was noted.

About two weeks after the onset, the patient was struck over the eye by a friend's elbow. About one week after this accident, the eyelid showed a black and blue discoloration. There was no pain and no disturbance of vision.

The patient's past history was negative except for the usual childhood diseases. The family history was negative.

Ocular examination on September 15, 1945, showed vision to be: R.E., 1.2—3 and J1 at 10 inches; L.E., 1.2 and J1 at 10 inches.

There was a swelling the size of an almond just below the right supraorbital rim involving the upper eyelid. The swelling had a doughylike feel with ecchymosis of the upper lid. Bruit and thrill were absent. There was a slight ptosis of the upper lid. The right globe, which appeared to be lower than the left, showed a limitation of movement when looking upward. Corneal findings were negative. The pupil was round and reacted to light and accommodation. The iris was a greenish blue. Fundus examination showed no unusual findings. Examination of the left eye was essentially negative.

Physical examination. The tissues in the nose were pale, a mucoid secretion was present, and the inferior turbinates were boggy. These findings suggested an allergic rhinitis. Examination of the oral cavity revealed enlarged, injected tonsils. The teeth were in good condition.

The remaining physical examination was negative.

Laboratory examination revealed the erythrocyte count to be 5,280,000; leukocytes, 14,050; hemoglobin, 102 percent; basophils, 2 percent; eosinophils, 3 percent; segmented, 75 percent; lymphocytes, 16 percent; monocytes, 4 percent. The blood Wassermann was negative.

X-ray examination of the skull was negative for bone injury or pathology. The sella turcica was of normal size and configuration. The optic foramen was normal. The sinuses showed "increased density in both frontals, ethmoid, and sphenoids due to hyperplastic changes probably associated with infection." The chest was negative.

Diagnosis was a hemorrhagic cyst of the right orbit.

Course. The patient was admitted to the hospital on October 28, 1945, and was operated the following day under general anesthesia.

An incision was made over the site of

the tumor which, on exposure appeared to be enclosed within a capsule. The mass was dissected out but was much larger than it appeared on the surface. The capsule ruptured during the dissection. The mass seemed to extend below the supraorbital rim and behind the eyeball. All visible tumor was removed. Upon palpation the superior rim of the orbit felt perfectly smooth. The wound was closed with interrupted dermal sutures.

Postoperatively, the child was given 10,000 units of penicillin intramuscularly

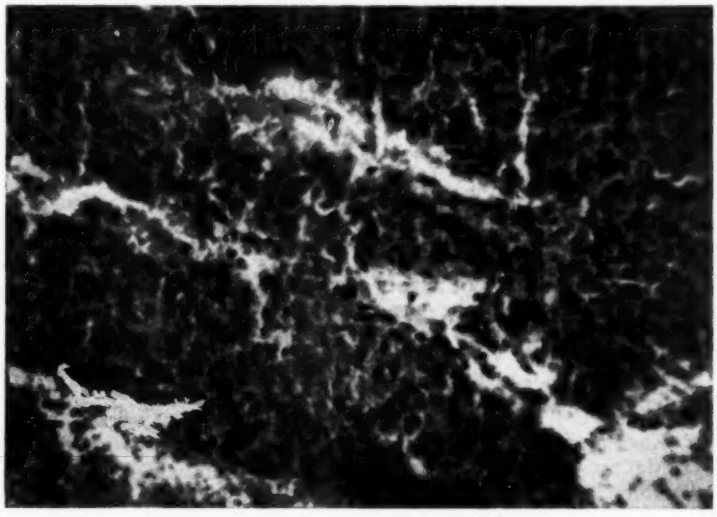

Fig. 2 (Carelli and Cangelosi). A photomicrograph reveals sheets of tumor cells that are composed of irregularly shaped nuclear cells which have vesicular nuclei. There is a moderate amount of light pink-staining collagen laid down around the cells. Many atypical mitotic figures are present throughout the cells. There are many dilated blood vessels throughout the tumor section, and in many places there is extravasation of blood cells between the tumor cells.

every two hours and continuous ice compresses were placed over the right eye. The dermal sutures were removed on the sixth postoperative day, and the patient was discharged on November 10, 1945 after an uneventful recovery. Visual acuity upon discharge was the same as that obtained preoperatively.

Pathologic report. The hospital pathologic report was: "Specimen consists of pieces of soft, white tissue and soft gray hemorrhagic tissue. Microscopic examination shows a highly cellular malignant tumor; type, glioblastoma."

In view of this pathologic report, a slide of the specimen was sent to the Army Medical Museum for information concerning the diagnosis and advice as to whether irradiation or exenteration of the orbit should be performed.

The following report was received from Col. J. E. Ash: "The tumor, while highly anaplastic, presents in some areas a distinct cavernous vascular pattern and in other portions capillary structures can be made out. Diagnosis: Hemangiosarcoma. Believe irradiation is indicated."

Following this report irradiation therapy was started on December 14, 1945. The girl received 200R. of X-ray irradiation every day for nine days, using 140 kilovolts, 25 ma., with a filter of 1 mm. of aluminum at a distance of 50 cm. from the eye. The irradiation was particularly directed at the superior surface of the eyeball, a lead shield being used for the protection of the globe. There was a slight erythema reaction.

Follow-up. The follow-up examination on January 10, 1946, revealed a ptosis of the right upper lid with a healed curvilinear scar just below the orbital rim. Palpation was negative for any tumor masses.

Vision was: R.E., 1.2—4 and J1 at 13 inches; L.E., 1.2—2 and J1 at 13 inches. The ocular movements were within normal lim-

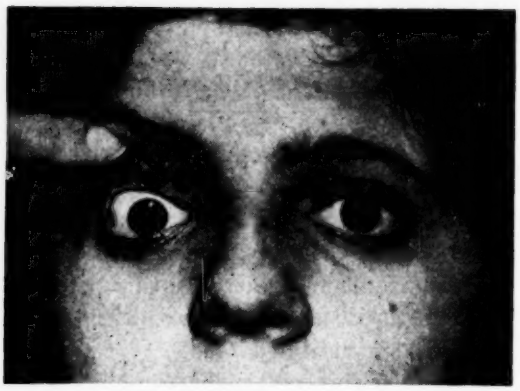

Fig. 3 (Carelli and Cangelosi). Appearance of the right eye 30 months postoperatively.

its; findings in the cornea and pupil were negative; the iris was greenish blue; and lens and fundus findings were essentially negative.

The girl was feeling perfectly well and was attending school regularly.

Comment

As the literature points out, angiosarcoma of the orbit is exceedingly rare; even the men with the most experience have seen only a few cases. The resulting confusion in histopathologic interpretations has been discussed and exemplified in this case.

Exophthalmus is the most frequently observed sign of the presence of any orbital tumor. Absence of pain, very slow growth, preserved motility of the eye, and elastic consistency and compressibility of the tumor are important signs in the diagnosis of orbital angiomas, but any malignant characteristics of the tumor become evident only upon microscopic examination.

This case is interesting not only because it presents a rare type of tumor, but also because the eyeball itself did not show any involvement, aside from the interference with motility. It is also noteworthy that the X-ray findings were negative.

This girl was operated 30 months ago, and there have been no visible signs of metastasis.

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A DISCUSSION OF DEFORMITIES OF THE SHAPE OF THE LENS

WITH A REPORT OF A CASE OF POSTERIOR LENTICONUS

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Both the rarity of lenticular deformities and the controversy concerning the factors causing these anomalies make the subject of deformities of the shape of the lens an interesting one.

These aberrations from normal lens shape can be differentiated from congenital or developmental cataracts, since an actual abnormal curvature in the shape of the lens is present. The defects are usually unilateral, but the case herein reported (lenticonus posterior) was bilateral. These lenticular deformities do not seem to be hereditary, as in cases of ectopia lentis where the factor of heredity has been definitely established.

CLASSIFICATION OF DEFORMITIES

For the purpose of this discussion, the subject has been divided into the following classifications.

True deformities. In this category are: (1) Lentiglobus, (2) lenticonus anterior, and (3) lenticonus posterior. Although infrequent in occurrence, posterior lenticonus is not so exceedingly rare as lentiglobus and lenticonus anterior.

False abortive forms. This classification includes: (1) Lenticonus internum or lenticonus perinuclearis posterior (Harrison Butler), (2) senile or acquired lenticonus, and (3) umbilication of the lens or monocular bilateral posterior lenticonus.

As far as terminology is concerned, the word "globus" describes the conditions more accurately because, with the exception of anterior lenticonus, the protrusions are more globular than conical in form. Before taking up the subject of posterior lenticonus in detail, it would be well to give a brief discussion of the various classifications.

DISCUSSION OF CLASSIFICATION

Lentiglobus. This condition is very rare and is differentiated from anterior lenticonus in that the projection is globular in shape instead of conical. The most probable cause is that, during intra-uterine life, the lens becomes permanently molded due to a rigid pupil.

Anterior lenticonus. This condition is extremely rare. The anterior surface of the lens is conical in form and the raised portion consists of clear cortex, while the nucleus remains normal. Since these cases often give the appearance of keratoconus, a careful examination is necessary to distinguish them.

Anterior lenticonus also develops during intra-uterine life and is thought to be due to an overstretching of the lens capsule; to a delayed separation of the lens vesicle; or to an adhesion of the cornea. Another plausible explanation is that of a weakened lens capsule. If there is a deficiency of the capsule, a type of anterior capsular cataract is produced. These two deformities are probably transitional stages of the same defect.

Lenticonus posterior. As Duke-Elder has pointed out, the projection is more globular than conical in shape so that the proper designation should be posterior lentiglobus. This condition is rare and is often confused with cases of false or abortive lenticonus. An uncomplicated case presents the characteristic oil-globule appearance of anterior lenticonus (Duke-Elder). (This description, however, cannot be applied with exactness to the case herein to be reported.)

In cases of posterior lenticonus, the central part of the lens is very myopic while the peripheral part may be emmetropic. Very

often the remains of the hyaloid artery are present. Dustlike opacities in the lens have been reported, as have occasional opacities in the infantile nucleus. Vogt described a bright-red reflex around the base of the globule. In my case, however, the edge of the globule appeared to be more like a glaucomatous cup.

In addition to a detailed slitlamp study of the posterior surface of the lens, a very valuable aid in differentiating this condition from pseudolenticonus was first demonstrated by Gullstrand.

While studying the movement of the Purkinje images on the posterior surface of the lens, Gullstrand noted the movement of the candle image on the posterior surface and could, thereby, determine the form and changes in the curvature of the surface. The posterior lenticular image is much smaller where the posterior surface of the lens is most strongly curved than in the surrounding area. If the image is caused to move about by moving the light, it elongates in passing from one zone to another and, in places, it disappears. These reflexes can demonstrate an essential change of form in the posterior segment of the lens. They can also show whether a portion of the lens near the posterior pole has protruded into the vitreous. The peculiar reflexes thus obtained can be compared to the images produced by a drop of oil on a lens.

Many theories have been advanced as to the etiologic factors in this condition, but the primary cause seems to be a congenital rent or weakness of the capsule. The idea that the globus is caused by traction from the hyaloid remnants does not seem plausible since hyaloid remnants are not found to exist in all cases and did not in mine.

The best assumption seems to be that the condition is an aberration of growth of the lens accompanied by a thinning of the capsule at the posterior pole. This probably occurs at the beginning, during, or after the fourth month (Ida Mann).

Lenticonus internum or lenticonus perinuclearis posterior (Harrison Butler). Harrison Butler reported this condition in a patient, aged 26 years, who had a typical case of lenticonus posterior in the other eye. The lenticonus internum consisted of an alteration in alignment of the zones of discontinuity in the posterior part of the lens without any alteration of the curve of the posterior surface. The adolescent nucleus appeared to be a sort of double bulge which, if it had been complete, would have formed a lenticonus (Ida Mann).

Senile or false lenticonus. This acquired anomaly of the nucleus, which is of normal form, occurs in elderly persons. The axial parts of the lens assume a high refractivity in advancing age or in cases of incipient cataract. This unusual picture has been observed in congenital cataractous changes in the fetal nucleus. Cases have been reported in which the lens has had a double focal point.

Umbilication of the lens. This condition could possibly be classified as an abortive form of monocular bilateral posterior lentiglobus that might be caused by the lens fibers not being long enough to meet at the suture involved.

Posterior lenticonus

Report of a case

History. This patient first consulted me when he was 47 years of age. He was born in this country and had had defective vision since birth. His father and mother were not related. He had four sisters and one brother. Because of poor vision, he left school at the third grade.

Ophthalmic examination. Vision in the right eye was reduced to 20/200. With a dilated pupil, it was improved to 20/200 plus. Vision in the left eye was 10/200. With dilatation, it was improved to 20/70.

Vision could not be improved with lenses nor with the stenopaic or pinhole disc. Examination of the right eye under homatropine disclosed spokelike lens opacities on the

nasal side in addition to the deformity of the posterior lens. In the left eye, besides the posterior lens deformity, there were spoke-like opacities below.

Treatment. In view of the fact that a dilated pupil improved the patient's vision and also because the definite signs of an incipient cataract already present suggested the possibility of a totally opaque lens, it was decided to perform an iridectomy. This procedure was carried out on each eye in such a position as to obtain the best vision. Figures 1 and 2 depict the condition following the iridectomies.

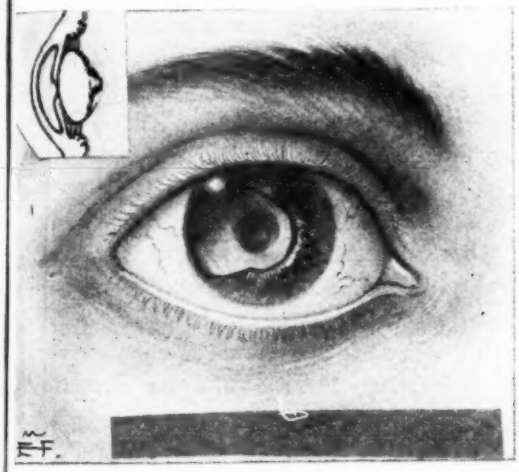

Fig. 1 (Doherty). This drawing made after the iridectomy of the right eye shows the condition of the posterior lens.

This operation provided an excellent opportunity to observe the pathologic conditions of the posteriors lens, but it brought very little improvement in vision. The presence of more dazzling probably accounted for the lack of improvement.

Slitlamp study of the posterior lens. In studying these two eyes with the slitlamp, the symmetry of the lesions in each eye was most noteworthy and certainly provides strong evidence that the condition was congenital in origin.

Throughout both lenses, more marked toward the periphery, were small linear flake-like opacities. The anterior Y was only partially seen and then only by careful manipulation of the slitlamp. The reflex from the conus caused this difficulty.

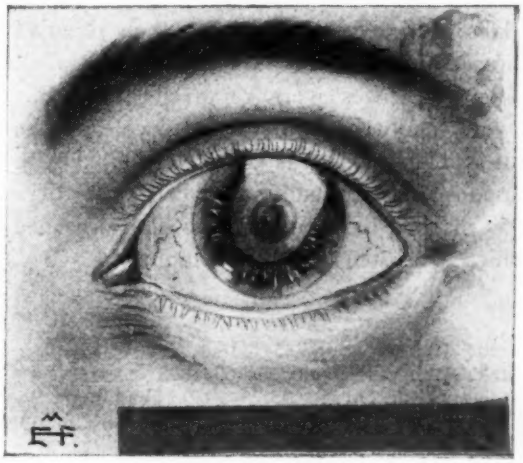

Fig. 2 (Doherty). Posterior lenticonus of the left eye. The drawing was made after an iridectomy.

The conus, itself, was cup-shaped. The ring reflex of Vogt, although present, was certainly not red. It was a brownish black. It was very distinct. When the slitlamp was moved, there seemed to be a second ring inside of the first. This was of a very light gray color with hazy borders and gave one the impression that it was a reflection or shadow rather than a real border. The general sheen of the conus was a light golden, and there were a number of opacities in the bottom of the conus when seen with the dot beam. These opacities looked something like crystals and, as the dot beam was moved from side to side, the general effect resembled slightly that of a kaleidoscope. Both eyes were essentially the same. There were no signs of the hyaloid artery, and the vitreous seemed to be normal.

Course. The lens opacities increased and, five years after the iridectomies, both lenses became entirely opaque and were removed. Vision at this time was: R.E., 20/30− with a +12.00D. sph.; L.E., 20/20−, with a +11.00D. sph. ⌒ +2.00D. cyl. ax. 45° (nasal).

Although every effort was made to remove the lenses with as little trauma as possible,

a laboratory examination after their removal showed no definite findings. About a week after the lenses were removed, there was severe hemorrhage in the left eye, and the anterior chamber was completely filled with blood. This gradually absorbed, but there was marked blood infiltration of the cornea which persisted for many months.

Conclusion

A discussion of deformities of the shape of the lens has been presented together with the report of an unusual case of posterior lenticonus. In conclusion, this question is proposed: "Would an intracapsular operation be considered in such a case?"

150 West 55th Street (19).

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NOTES, CASES, INSTRUMENTS

HYALINE MEMBRANE OF THE IRIS*

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REPORT OF TWO CASES

CASE 1

History. Sister M. B., aged 55 years, was born with congenital cataracts. In 1890, Dr. David Webster, Sr., performed bilateral optical iridectomies. In 1916, Dr. David Webster, the nephew, recorded 5/200 vision for the right eye and no light perception in the left eye which was due to absolute glaucoma. He enucleated the left eye at that time. In 1925, there was detachment of the retina in the right eye with complete loss of vision. In 1935, there was secondary glaucoma in this eye and on March 9, 1945, it was enucleated because of acute pain. At this time blood was noted in the anterior chamber and the eye was stony hard.

Pathologic findings. The globe is bulged temporally in the region of the optic nerve making it somewhat larger than normal; the ciliary body is barely visible. The retina is completely detached and there is blood in the anterior chamber and in the subretinal space.

Microscopic findings. The filtration angle is completely occluded by firm iris adhesions. The iris is necrotic and atrophied and has an occasional area of round-cell infiltration. The pigment epithelial layer of the iris is atrophic and cystic.

On the anterior surface of the iris lies a hyaline membrane that is continuous with Descemet's membrane. A layer of endothelial cells lies on the surface of the membrane which faces the aqueous, and these cells are similar in appearance to the endothelial cells of Descemet's membrane. The hyaline membrane is the same thickness as Descemet's except near the tip of the iris near the pupillary border where it becomes quite a bit thinner. There are many blood cells in the aqueous and an albuminous fluid.

The ciliary body is completely atrophic at the corona leaving only some hyalinized ciliary processes, the nonpigmented epithelium of which has proliferated moderately. The flat part of the ciliary body is only slightly atrophic. There is a thin remnant of cataractous lens matter but no lens fibers are seen.

The retina is completely detached and atrophic so that its constituent layers are not recognizable. The choroid is atrophic and has numerous excrescences of the lamina vitrea (drusen). The optic nerve is deeply cupped and atrophied. There is a formation of glial and fibrous tissue in front of the deep depression. Some blood lies between the retina and choroid.

CASE 2

History. G. L., a man, aged 46 years, always had had poor vision in the right eye. In 1915, the right eye was operated on by Dr. Thomas Curtin for cataract. There had been no vision in the eye since then. The left eye has always been myopic with corrected vision of 20/25 and has a zonular cataract. When seen by Dr. I. Hartshorne in November, 1945, the right eye was blind and the tension was 40 mm. Hg (Schiøtz). The globe was removed on November 24, 1945.

Pathologic findings. The globe is much larger than normal especially in the transverse diameter. There is thinning of the sclera and an increase in the size of the temporal portion of the globe. The optic nerve shows pronounced cupping. The ciliary body is barely visible.

Microscopic findings. The filtration angle is occluded by firm iris adhesions and a hyaline membrane continuous with Descemet's grows over the iris along its outer

* From the Laboratory of the Manhattan Eye, Ear and Throat Hospital.

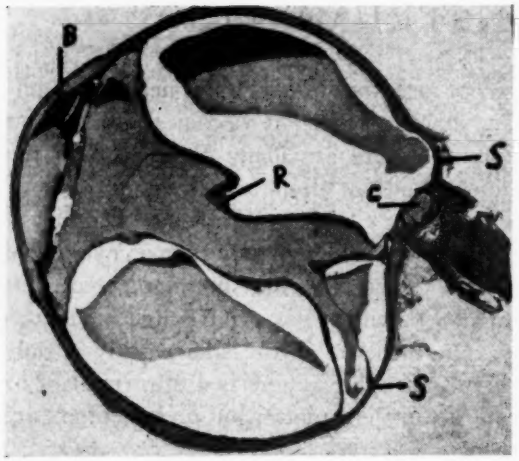

Fig. 1 (Laval). The sclera (S) is stretched and thinned posteriorly and there is moderate cupping (C). The retina (R) is completely detached. There is blood (B) in the anterior chamber.

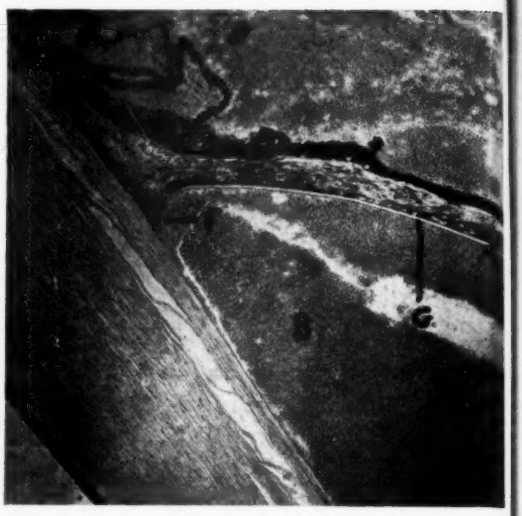

Fig. 2 (Laval). The glass membrane (G) lies on the anterior surface of the iris and is continuous around the filtration angle (F). The anterior chamber is filled with blood (B).

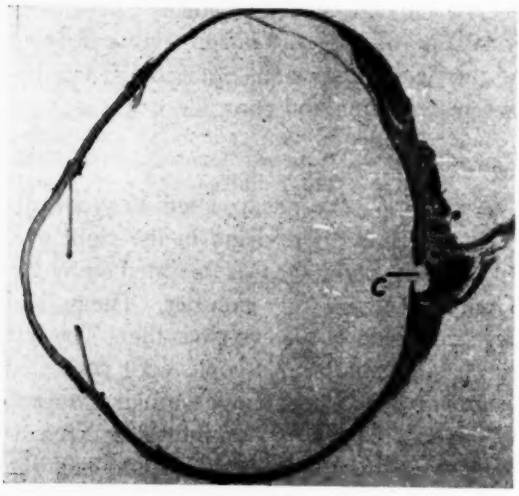

Fig. 3 (Laval). The globe is quite enlarged and there is pronounced cupping (C).

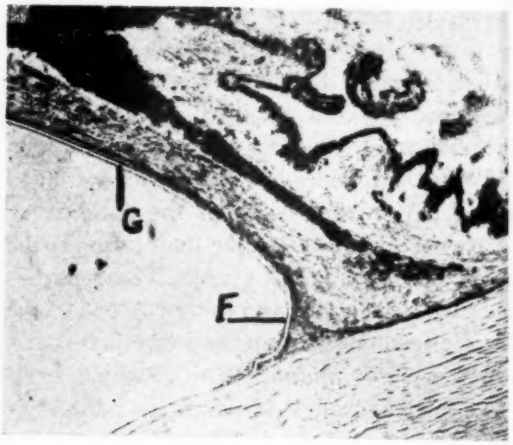

Fig. 4 (Laval). The glass membrane (G) lies on the anterior surface of the iris and is continuous around the filtration angle (F).

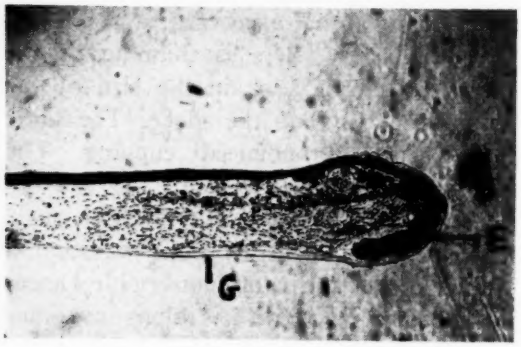

Fig. 5 (Laval). The glass membrane (G) becomes thicker near the pupillary area of the iris and ectropion (E) of the pigment epithelium of the iris is present.

surface. A layer of endothelial cells lies on this membrane facing the anterior chamber and is continuous with the endothelium of Descemet's.

The iris is markedly atrophic with ectropion of its pigment epithelium. The ciliary body is practically absent and is represented by a thin layer of fibrous tissue. A few atrophic processes remain and there is some proliferation of the nonpigmented epithelium.

The retina and choroid are intimately adherent with marked atrophy of the cellular layers of the retina. There is pronounced cupping of the optic nerve with some proliferation of connective tissue at the margins of the depression. The optic nerve is atrophic.

Comment

Collins and Mayou state, "a new formation of a hyaline membrane on the anterior surface of the iris may be produced beneath its layer of endothelial cells." It seems to be produced by the mesoblastic endothelial cells. In cases of infantile glaucoma, it may be the cause of the glaucoma by being continuous with Descemet's membrane around the angle. In the two cases reported here, both in adults, there was glaucoma. This may have been caused by the glass membrane growing over and around the filtration angle.

136 East 64th Street (21).

BILATERAL CHALCOSIS LENTIS WITH ENDOPHTHALMITIS OF THE RIGHT EYE

Abraham Schultz, M.D.
Chicago, Illinois

Report of a case

The destructive effect of penetrating copper particles upon the eye has been well recognized during the past 50 years. The intraocular reactions produced by this metal were first strikingly demonstrated by Leber,[1] in 1892. His classic work showed that the reaction of copper was influenced by the ocular tissues in which it became imbedded. When in contact with vascular tissue, such as iris, chemical suppuration rapidly occurred. Avascular tissue, however, such as lens or vitreous, usually tolerated the metal by enveloping it with a protective coating of albumin.

Because of the frequent inclusion of copper as an alloy of explosive missiles, the penetrating eye injuries incurred in World War II by these fragments were apt to produce grave ocular sequelae. The fate of an eye so injured depended primarily on the size, location, and percentage of copper contained in the intraocular foreign body. Such particles, although usually sterile because of the heat generated by their high velocity, often produced a chemical inflammation with rapid aseptic suppuration and final destruction of the globe.

Occasionally, however, these copper fragments may be tolerated in the eye for long periods, with preservation of good vision. The literature is replete with instances of this nature as reported by Würdemann,[2] Schwartz,[3] and others.[4]

When retained, these copper particles produce a constant chemical reaction with gradual development of ocular chalcosis.[5] Under these circumstances, the cornea may become impregnated with copper at the level of Descemet's membrane, especially about the limbus. Occasionally the vitreous becomes involved, and chronic irritation of the retina supervenes. More commonly, however, chalcosis lentis or copper cataract is the result of this chemical process. This was first recognized by Purtscher,[6] in 1918, during World War I, as diagnostic of retained intraocular copper particles which are slowly oxidized. It is a shallow, polychromatic opacity which is situated just beneath the anterior capsule of the lens in the form of a sunflower. Vogt[7] believed that this forma-

tion was facilitated by the posterior ridges of the iris as they rubbed against the anterior capsule of the lens, the center of which corresponds to the iris pupil.

The following case of bilateral chalcosis lentis is reported because of the remarkable ocular sequelae observed four years after the original injury.

Case report

History. A soldier, aged 21 years, with 16 months' service, was admitted to the ophthalmic service of an army general hospital April 4, 1942, complaining of pain, photophobia, and marked loss of vision in the right eye. These symptoms had suddenly appeared a month previously following a mild contusion of this eye which was accidentally incurred while working on a truck. Despite prompt treatment at the local station hospital, no improvement was noted, and he was transferred here for further observation and treatment.

Additional history revealed that four years previously, while still a civilian, he had sustained a perforating injury of his left eye as the result of a dynamite cap explosion. His left hand was also wounded at that time, requiring partial amputation of the thumb and forefinger. The injured eye gradually improved under conservative treatment, and he was released from the hospital three months later with complete restoration of vision. No ocular symptoms were noted since then until the present episode.

Ocular examination. Vision upon admission was light perception with poor projection in the right eye, and 20/20 in the left eye. A diffuse circumcorneal injection was present in the right eye, with tenderness over the ciliary region. No external signs of previous ocular trauma were evident. A definite aqueous flare was visible in the right anterior chamber, associated with a moderate increase of cells. The pupil was dilated and fixed as the result of previous atropinization. A serrated, gray, superficial opacity of the lens was grossly visible in the center of the pupillary area measuring 6 mm. in diameter.

Biomicroscopy under direct illumination revealed this opacity to consist of fine particles which were situated beneath the anterior capsule of the lens, producing a gray-green metallic sheen. These deposits were condensed into the shape of a sunflower, with a relatively clear center 2 mm. in diameter, from which about 40 slender petals of various lengths radiated peripherally. The remaining portion of the lens was not affected.

The vitreous appeared very turbid and was filled with much cellular and fibrinous exudate. The fundus, although partially obscured, revealed a severe bulbous detachment of the temporal half of the retina which overlaid the optic disc and extended diagonally from the 11- to the 5-o'clock positions.

The left eye showed no evidence of external injection. A small healed pigmented perforation was present in the nasal portion of the sclera 8 mm. from the limbus and 1 mm. above the lower lid margin. The aqueous fluid and vitreous appeared clear. A gray-green, superficial sunflower opacity, identical with that of the right lens, was situated beneath the anterior capsule of the left lens. The fundus revealed an old healed horizontal streak of atrophic chorioretinopathy in the extreme nasal periphery through which the sclera was visible. This was the site of the original intraocular path of the foreign body. A pale-green elliptical cyst which projected about 12 diopters into the vitreous was seen 3 disc diameters nasal to the optic nerve (fig. 1). The "tail" of this cyst was firmly imbedded in the retina, while its free anterior end contained a triangular metallic particle having a distinct copper luster.

Roentgenographic observations. Roentgen examination of both orbits revealed a minute metallic fragment in the left globe

corresponding to the position observed by ophthalmoscopy. Several fine metallic particles were also visible above the left frontal sinus. No metallic densities were observed in the right orbit.

Course in the hospital. The patient was placed on intensive foreign-protein therapy, with five increasing doses of triple typhoid vaccine which were injected intravenously at 2-day intervals. Chemotherapy in the form of sulfadiazine was administered for 10 days, attaining a level of 10.6 mgm. per 100 cc. of blood. This was followed by large doses of sodium salicylate for two weeks. Local atropinization of the right eye in conjunction with moist heat was continued throughout his hospitalization. All foci of infection including teeth, tonsils, and the genito-urinary tract were ruled out. The Mantoux reaction was negative with 0.01 mg. of old tuberculin. Laboratory studies which included the sedimentation rate and differential white count were within normal limits.

Despite all systemic and local measures the acute endophthalmitis of the right eye remained essentially unchanged. Because of the persistent suppuration in a hopelessly blind eye, enucleation was recommended. This procedure, however, was refused by the patient. After maximum hospitalization of six months was attained, he was transferred to a veterans facility for further observation and treatment. An opportunity to examine him 10 months later revealed a persistent endophthalmitis of the right eye with almost complete absorption of the lens. The left eye, containing the intraocular particle, remained quiescent, and the chalcosis lentis was unaltered.

Comment. Despite the absence of roentgenographic evidence of any metal in the right globe, the acute endophthalmitis in conjunction with the presence of chalcosis lentis in this eye, identical with the lens changes of the left eye containing the copper particle, must be due to a similar metal

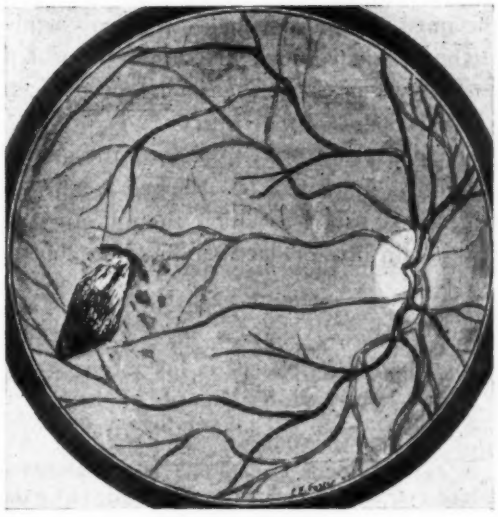

Fig. 1 (Schultz). Cyst containing copper particle imbedded in retina of right eye.

which had become absorbed. The presence of sympathetic ophthalmia in the right eye may be ruled out because of the quiescent left globe and characteristic copper changes in both lenses. The suppurative process in the right eye must, therefore, be caused by a perforating copper fragment which occurred at the time of the original injury four years previously but was not noted at the time because of the apparently more serious wound of the left eye. Both copper fragments then lay dormant four years, gradually producing a bilateral chalcosis lentis, with sudden onset of an aseptic suppuration of the right eye at the end of that time.

Summary and Conclusions

A case of bilateral chalcosis lentis is described with continued toleration of a copper particle in the left eye and subsequent severe endophthalmitis of the right eye four years after the original injury.

Intraocular copper fragments, even when apparently innocuous, usually produce a constant chemical change which may affect the cornea, lens, or vitreous. Chalcosis lentis, characterized by a sunflower metallic opacity beneath the anterior capsule of the lens, is

the most common sequela of these chemical changes. A severe aseptic suppuration of the eye, however, may suddenly occur years after the penetrating injury.

This case serves to emphasize the guarded prognosis that must be attached to all penetrating eye injuries, which, though quiescent, still retain intraocular metallic fragments. It also stresses the importance of examining both eyes carefully at time of injury, even though only one eye is apparently affected. Roentgen examination of both eyes is indicated in all questionable cases of bilateral involvement.

30 North Michigan Avenue (2).

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A TRIPLE-ARMED SUTURE FOR RESECTIONS

Jack V. Lisman, M.D.
New York

This suture is thought to be an improvement, as well as a simplication, of the two double-armed sutures generally used for the resection operation on the external ocular muscles. It has been used routinely for the past 18 months on the service of Dr. Wendell L. Hughes at the New York Eye and Ear Infirmary with satisfactory results.

The usual double-armed suture may be converted to a triple-armed suture by fixing a No.-3, French, open-eye needle to its center (fig. 1). The two end needles are passed through the marginal muscle fibers close to the upper and lower muscles edges. The central needle is passed through the muscle at its center from the outside in. The three needles are then passed through the muscle stump (fig. 2) and the central needle is cut free, leaving two complete sutures. There is no possibility of leaving any muscle tissue centrally that is not included in the suture, as might be the case when two separate double-armed sutures are used. The result is better than using two double-armed sutures.

The advantages are: (1) its simplicity, (2) the easier alignment of sutures in the muscle belly, (3) saving of suture material, (4) greater accuracy in placing the suture, (5) saving of time, especially important under general anesthesia, (6) less tissue trauma since there are only three muscle, tendon, and sclera! punctures rather than the four made by the use of two separate sutures.

654 Madison Avenue (19).

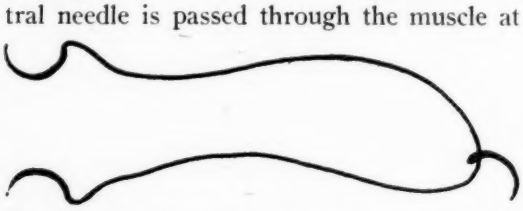

Fig. 1 (Lisman). A French-eye needle is fixed to the middle of a double-armed suture.

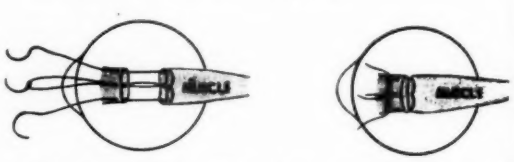

Fig. 2 (Lisman). The three needles are passed through muscle and stump. The needles are cut loose, leaving four ends which are tied.

SOCIETY PROCEEDINGS

Edited by DONALD J. LYLE, M.D.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

April 16, 1947

DR. HOWARD F. HILL, *presiding*

INTEGRATED IMPLANTS AND ARTIFICIAL EYES

DR. WENDELL L. HUGHES of Hempstead, Long Island, New York, presented a paper on this subject which was published in the Journal, **31**: 303-310 (Mar.) 1948. A brief abstract follows.

The decision to use Vitallium was based on the following considerations. Plastics were rejected because of (1) insufficient strength for design contemplated, (2) possibility of wear and scratching in time, (3) occasional allergy, (4) effect of age, (5) unsatisfactory union of metal and plastics. Gold was rejected because of prohibitive cost, while tantulum was objectionable because of tissue reaction and because it was difficult to fabricate. Vitallium was decided upon because of its moderate cost, its strength, ability to be cast in any shape, and because its prolonged use in other regions of the body showed minimal tissue reaction.

The implants and surgery were described in detail. The implants to be used after enucleation are of two sizes, the smaller one being used to replace previously buried implants when the usual implant would be too large. The larger implant consists of a polished, smooth, posterior spherical portion 18 mm. in diameter, with an anterior portion approximating a truncated cone, ending in a flat face 10 mm. in diameter. On the anterior surface of the flattened portion is the depression which receives the peg extending from the rear surface of the prosthesis. Surrounding the neck of the implant is a ring attached to it by eight small bars. The recti muscles with a tab of sclera attached are fastened to the ring of the implant. Tenon's capsule is then pulled through the ring between the recti and sutured. The conjunctiva is then sewed around the flat anterior surface, anchoring it to the tissues passing over the ring.

In conclusion, Dr. Hughes summed up the advantages of this type of implant over the buried type as follows:

1. The motility of the implant is transmitted to the artificial eye because of the integration of the eye with the implant. The slippage between the buried type of implant and the eye is eliminated.

2. The position of the eye may be changed simply by altering the position of the peg on the back of the eye.

3. A stock plastic eye can frequently be used simply by placing a peg on the posterior surface to integrate it with the implant.

4. The motility is excellent in all directions as noted by measurements. In several of the cases reported, convergence was noted.

5. The normal fold of the upper lid is retained and the sinking in, so common with the ordinary artificial eye with a buried implant, is eliminated. This is due to the eye being supported by the implant through the medium of the peg on the back of the eye integrating it with the implant. The eye is held backwards so that the peg is held into the depression on the front of the implant by the normal tonicity and muscles of the lids. The lower lid no longer needs to support the entire weight of the eye plus the pressure exerted by the upper lid.

6. One piece metallic hollow construction of metal .002-inches thick is an advantage over any combination of two substances; metal, plastic or otherwise.

Discussion. Dr. H. B. C. Riemer asked

about the formation of granulation tissue at the conjunctival edge. Dr. Hughes said it had occurred once, at which time he simply cut it off. He did not know what happened to the edge of the epithelium around the implant, but as pure conjecture thought a connective-tissue layer is formed as a result of foreign body reaction at the junction with the implant.

Dr. Howard F. Hill inquired about the length of time the implants had remained in. Dr. Hughes replied that in all his completed cases the implants have been in longer than three months.

Dr. Riemer then asked in what type of case Dr. Hughes felt evisceration was safe, since Dr. Riemer thought the majority of Boston surgeons did not regard it as a safe operation.

Dr. Herman Grossman also asked about the relation of sympathetic ophthalmia to advisability of evisceration. Dr. Hughes replied that any suggestion of the presence of an intraocular tumor or injury through the ciliary body contraindicated doing an evisceration.

Dr. Grossman inquired about the removing of a buried implant and replacing it with Dr. Hughes' implant. Dr. Hughes said that there would not be room for a full-sized implant, but that he was going to try it with a smaller one. The only cases that are suitable are ones in which there is good fascial and conjunctival covering of the implant so that one can get strips connected with the recti and also strips of fascia to go between the recti around the ring. He felt it would be impossible to put an implant in a socket in which no implant was buried.

Development of Monoplex eye

Mr. Jardin of the American Optical Company (by invitation) spoke of the development of the Monoplex eye, which is an attempt to put the artificial eye on a standardized basis of colors, shapes, and sizes. This prosthesis is made of plastic and is subject to further adjustments in fit by a qualified technician.

Mahlon T. Easton,
Reporter.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

April 24, 1947

Dr. Burton Chance, *chairman*

Rubeosis iridis diabetica

Dr. Joseph Waldman and Dr. David Naidoff (by invitation) presented the subject. Rubeosis iridis is a comparatively rare condition in which a noninflammatory proliferation of new blood vessels occurs on the anterior surface of the iris. It is usually associated with glaucoma. Salus first described the condition in 1928, and used the term rubeosis iridis diabetica when he observed it bilaterally in three diabetic patients, all of whom eventually developed glaucoma.

The appearance of the iris is characteristic; the anterior surface is covered by radially arranged new vessels, especially near the sphincter region where the individual vessels anastomose to give the appearance of a ring about the pupil. The vessels end at the pigment margin without extending over it. Beginning at this capillary net some larger vessels spread over the iris, and disappear in the angle of the anterior chamber.

Kurz, in 1937, first described the gonioscopic and pathologic findings. On gonioscopy he found large vessels to run peripherally into the angle where they divided into innumerable branches to connect directly with Schlemm's canal, and to form extensive peripheral synechias. With the development of atrophy of the iris, the vascular net in the rubeotic eye tended to disappear. Pathologic study revealed that the new vessels were unassociated with inflammation or with newly formed tissue, but lay in and

upon the iris itself. Hemorrhagic retinopathy and a tendency to vascular proliferations in and on the retina and optic nerve were frequent concomitant findings.

Hyphemia is common, and in all reported cases a recalcitrant glaucoma results which yields only temporarily or not at all to treatment, medical or surgical. In 1945, Fralick reviewed 32 reported cases of rubeosis iridis associated with diabetes and added three cases which he had observed; of the 35 cases only one failed to develop glaucoma and in this case, reported by Wegner in 1939, treatment was considered successful when an intracapsular cataract extraction was performed. Since then, Meyer and Steinberg, Scobee, Grury, and de Roetth have reported the use of cyclodiathermy in controlling the glaucoma in rubeosis iridis diabetica although this treatment resulted in atrophic eyes.

An interesting observation is the relationship between arterial hypertension and rubeosis; this was first mentioned by Kurz. Fralick, in his review, found that 16 of the 35 cases suffered from hypertension. It seems that diabetes and hypertension together in the same patient manifest a much higher percentage of vascular pathologic change than when either is present alone.

The following case is from the Number 2 eye service of the Jefferson Medical College Hospital.

Case report

M. G., a woman, aged 58 years, first learned that she suffered from diabetes in 1943. Treatment since then had been dietary and haphazard. Insulin had not been used. For the last six months she had also been treated for hypertension. In December, 1946, the patient had suffered sudden loss of vision in her left eye, and was told then that it was due to a severe vitreous hemorrhage. On February 24, 1947, one week before admission to the Hospital, the patient became aware of what she termed "pink vision" in her right eye, the good eye; everything at which she looked had a reddish hue. That night she suffered severe pain in the right eye, and the next morning vision was limited to light perception. She was seen by one of the members of the staff that day and a diagnosis of acute glaucoma was made. At this time hyphemia was present. Treatment consisted of eserine drops and hot compresses, but the elevated intraocular pressure, pain, and loss of vision persisted until her admission to the Hospital on March 1, 1947.

Eye examination. On admission the eye examination revealed vision to be O.D., light perception; and O.S., 4/60. The intraocular pressure was O.D., 65 mm. Hg. (Schiøtz); O.S., 16 mm. The right eye was severely congested throughout. Biomicroscopic examination showed the cornea to be edematous; many small gray keratic precipitates were present. The aqueous was slightly turbid. The iris stroma was atrophied, and a narrow ectropion uvea extended around the entire inner pupillary border. Just outside this pigmented margin of the pupil was a fine network of newly formed blood vessels, which covered the sphincter zone in a wreathlike fashion and gave a reddish hue to this portion of the iris. From this vascular zone on the surface of the iris several more or less straight and larger vessels coursed toward the base of the iris; some terminated in tufts of small capillary networks situated about the base of the iris; others disappeared behind the limbus. Uveal pigment and grayish debris were noted on the anterior surface of the lens which had suffered a general loss of transparency with other cataractous changes. Fundus examination was impossible because of the changes in the media as noted.

The left eye presented a normal external appearance. The vitreous was loaded with fine and coarse opacities. Many infiltrates typical of diabetes were noted in and about the macular area, and numerous retinal

hemorrhages, both punctate and flameshaped, were present throughout. The retinal arterioles showed marked sclerosis. Biomicroscopic examination revealed numerous fine gray and brown keratic precipitates. The anterior chamber was clear. Atrophy of the iris stroma and absorption of iris pigment were evident. On the iris, near the pupillary border, at about the 9-o'clock position, a tiny network of new vessels was noted. The lens changes were similar to those seen in the right eye.

General physical examination showed a blood pressure of 210/120 mm. Hg; generalized arteriosclerosis; and slight cardiac enlargement.

Significant laboratory findings were: Blood Kahn, negative; blood sugar, 235 mgm. percent; blood urea, nitrogen 25 mgm. percent; serum cholesterol, 222 mgm.; urea clearance, 35 percent; coagulation time, 3½ minutes; bleeding time, 1¼ minutes; capillary fragility (tourniquet test) normal. Urine showed 4+ albumen, trace of sugar, many red blood cells, and many epithelial casts. An electrocardiogram showed slight left axis deviation. There were no other findings indicative of myocardial change.

Diagnoses. O.D., rubeosis iridis diabetica and secondary glaucoma; O.S., diabetic retinopathy and retinal arteriolarsclerosis. Diabetes mellitus. Arteriosclerotic and hypertensive renal disease. Generalized arteriosclerosis.

Course. Miotics—eserine, prostigmin, mecholyl and D.F.P.—were all employed, without any decrease in the intraocular pressure; on the contrary, these drugs increased the pain and caused incessant vomiting which prevented proper control of the diabetes. Pilocarpine (8 percent) was then used, but the results were the same, even when the strength was reduced to one percent. After three weeks, since no beneficial results were obtained, all miotics were discontinued, and the patient became fairly comfortable, although vision was completely lost. From the time of admission the patient had received 20 mgm. of rutin four times daily. On April 4, 1947, the patient again suddenly experienced excruciating pain in the right eye. Examination then revealed a severe hyphemia with an intraocular pressure of 68 mm. Hg (Schiøtz). The pain has now diminished, but the anterior-chamber hemorrhage is still present. The patient's family was informed that operative procedures were usually unsatisfactory in these cases, and that enucleation was to be considered for the relief of intractable pain.

Discussion. Dr. Burton Chance: I recall a case of rubeosis in the service of the late Dr. Schwenk, 20 or more years ago, in a diabetic woman, who failed to return for further study because, so we were informed, she died from the severity of her general disease. I have not seen another case since.

Contaminated ophthalmic ointments

Dr. Louis Lehrfeld and Dr. Edward J. Donnelly discussed this subject. Ophthalmic ointments have been and are prescribed and used by eye surgeons throughout the civilized world. By far, the ointment most commonly used by the family physician is yellow oxide of mercury. The American lay public has used this ointment as a household remedy for external eye diseases. It is now to be replaced by sulfathiazole ointment. In the experience of one of us (Dr. Lehrfeld), such ointments as bichloride of mercury, boric acid, and ammoniated mercury have been used in collapsible tubes on numerous patients in office practice with a thought to economy until the last drip is expressed. At the Wills Hospital, it was our experience for years to use bichloride of mercury ointment (1:3,000) following all cataract operations merely because we had seen our predecessors do the same. Not more than seven years ago, we witnessed a corneal transplant performed by a well-known New York surgeon, in which the surgeon squeezed a goodly portion of an ointment from a collapsible tube into the patient's eye for antisepsis and lubrication. On another occasion, we saw motion pictures of a transplant by the same surgeon in which he advocated

the use of sulfathiazole (5 percent) immediately after the operation and then, at a later period, penicillin ointment.

Most ophthalmic surgeons and students of ophthalmology are inclined to play "follow the leader." It is not good form to question the masters who have obtained good results.

Personal experience of a continuous chain of infections following operations makes the surgeon stop to recount his steps with an effort to find out the missing link in asepsis and antisepsis.

When our attention was directed to the use of ointments in general, we dismissed at once the old ointment jar and directed our study toward the sterility and the maintenance of sterility of ointments commonly used in collapsible tubes.

It has been our experience that the ointment in fresh tubes, regardless of the name of the ointment, is different in color and consistency in the first sample expressed, compared with the second. It was also found that the nozzle of the tube was never free of ointment substance after a quantity was expressed. Pressure by the fingers left an extra quantity at the tip of the tube over which the cap was replaced. This overflow of ointment substance remained in the cap and on the nozzle of the tube until the next use. It is not always customary to express some of the ointment onto a towel or a pledget of cotton before using. In other words, the ophthalmologist has a false sense of security when he relies on the ointment in every collapsible tube being sterile until the last squeeze. It has been believed that the contents of the ophthalmic tube were sterile in the beginning and in the end. I feel certain that most ophthalmologists used ophthalmic ointsments in the treatment of corneal ulcers with the belief that the germicidal value of its contents was sufficient to destroy the bacteria present.

Strangely enough, you and I have never seen an ophthalmic ointment in a collapsible tube marked "sterile," and yet for years you and I have ordered ophthalmic ointments in the treatment of hordeola, blepharitis marginalis, ulcerative keratitis, and injuries to the eye with a smugness founded upon custom rather than scientific knowledge. We felt that the healing qualities of ointments were guaranteed by every textbook on ophthalmology. Fisher, Accousti, and Thompson (Bacterial contaminations in sulfonamide ointments, J.A.M.A., 122:855-858 (July) 1943) reported from the Warner Institute for Therapeutic Research that 5-percent sulfanilamide, sulfathiazole, or sulfadiazine ointments in a water-dispersible base may become contaminated with disease-producing organisms which these sulfonamides are not capable of killing.

Experiment on ophthalmic ointments

The authors wish to present evidence that most ophthalmic ointments in new and unused tubes are sterile. We wish to prove that once a fresh tube is opened the remaining contents are very frequently contaminated.

Data regarding culture media. The culture media used in this experiment was brain-heart infusion agar with sterile human blood. Approximately one inch of sample was expressed from each collapsible tube onto the culture media. The period of incubation varied from one week to 10 days. The first culture appeared, varying from 48 to 72 hours. The incubation temperature was 37°C.

The ophthalmic ointments used in this series of experiments were from six different manufacturers.

Cultures made. Cultures were made of the contents of 50 used tubes and 24 unused tubes of commonly known ophthalmic ointments as found on the open market. Three control Petri dishes were also observed, having been exposed the same time as cultured media.

Of the 50 tubes, which had been used more than once, a goodly proportion showed contamination by bacteria such as Staph. albus hemolyticus, Staph. aureus hemolyticus, fungi (species not determined), and other organisms, which were not identifiable by

microscopic examination alone. Eight of 15 tubes of 5-percent sulfathiazole ointment, which had already been used at least once, showed growth. Four of 11 tubes of bichloride of mercury (1:3,000) were found to be contaminated. Two of five tubes of penicillin ointment (500 units per gram) revealed growth. Two of seven tubes containing epinephrine bitartrate, which had been opened once or more, were positive. There was one positive out of six tubes of atropine ointment which had been used. Three pontocaine ointment tubes were found to be negative. A tube of eserine ointment (1 percent) which had been used on postoperative cases, showed many fungi. One borofax tube was negative.

Cultures of unused tubes. Twenty-four new tubes of ointment were selected from a stockpile of boxes containing 5-percent sulfathiazole ointment. One tube was selected from each supply box as a spot check (each original having 50 small boxes of ⅛ oz. each).

In 12 new unused tubes the first portion of ointment was cultured; all samples were negative. In another group of 12 new tubes, the entire contents of each tube were cultured. One was positive. Three controls consisting of blood agar were exposed for the same length of time as was required to smear the ointment from the tube. The three controls were negative, indicating there was no contamination from the outside atmosphere during the period of culturing.

There was sufficient information in all the experiments to indicate that the unused tube of ointment was, in most instances, sterile, while the used tubes were frequently contaminated.

The findings in this study call for a revaluation of the use of ophthalmic ointments in the eye postoperatively. Further, they call for the revaluation as to the use of ointments for ophthalmic conditions in general.

The authors appreciate the difficulty of sterilizing ophthalmic ointments. The composition of the tubes and of the ointments enters into the difficulty of marketing or preparing sterile ointments in collapsible tubes.

Conclusions. The authors do not have any evidence to prove that infections actually occur from the use of contaminated ointments. Surgeons of experience, however, do not wish to publicize overwhelming proof in the form of blind eyes. The authors do not have proof that the organisms found in the contamination were pathogenic bacteria. The mere fact that the ointments do contain organisms is sufficient proof that pathogenic bacteria may also be present. One may question why more infections do not occur following the use of ointment in used tubes. The answer can only be a conjecture. Either the lysozymes of the tears have their effect upon certain bacteria or the eye itself possesses a factor "X," which saves most patients from infection following intraocular surgery. Scientists do not willingly or knowingly place contaminated ointments into open wounds or even into a healthy eye.

Our experiments have convinced us that it would be well to discontinue the use of ointments postoperatively. We get along very well without them. Perhaps we, too, were formerly the subjects of habit and custom.

We are greatly surprised to learn that sulfathiazole ointment and penicillin ointment may become contaminated before the contents of the tube are exhausted. We have lost faith in the use of ointments. Our confidence can only be restored if an ointment could be produced sterile in containers for one application only. It is hoped that the experiments here reported may stimulate renewed interest in ophthalmic therapeutics.

Discussion. Dr. Louis Gershenfeld: I think we are indebted to Dr. Lehrfeld and Dr. Donnelly for the presentation of this paper on the sterility of ointments. Generally speaking, information like that comes from laboratory workers and, therefore, does not strike the ophthalmologist with the same force and meaning as it does when coming from an ophthalmic surgeon.

Some 25 years ago when I was very much concerned about the sterility of ampules used

for internal medication, I was at a meeting with the Commissioner of Food and Drugs. As you know, the Food and Drug Administration is interested primarily in the interstate-commerce traffic of food and drugs. During the discussion, I asked Mr. Campbell, the commissioner, whether or not his department had examined or investigated ampules on the open market. Mr. Campbell did not recall, but turned to two of his assistants and asked them. Their reply was they didn't think so. I then said to Mr. Campbell, "Don't you think it would be of more interest, perhaps, and certainly of greater value, if we concerned ourselves with the examination of ampules on the market and especially with the sterility of parenteral solutions than with such routine examinations as noting whether the strychnine content of Nux Vomica was 1.15 percent or 1.05 percent?"

Routine examinations are important, but it is of greater importance to make certain that solutions for direct injection, which may sooner or later reach the bloodstream, are sterile. I was surprised to learn nothing was being done as far as examining for sterility was concerned. My attention had been directed to this because a prominent internist had asked me to examine three identical ampules which he had. Upon examination, I found in each ampule a hemolytic Staph. aureus, which produced suppuration in rabbits. The internist had thought that something was wrong, since, of the nine other ampules of this lot which he had injected into his patients, abscesses had resulted in four of the cases. The other patients had never come back, and he was wondering what was the matter.

I immediately wrote an editorial for one of the journals, and it was at that time that the Food and Drug Administration proceeded to spend over $25,000 to look into the sterility of parenteral solutions throughout the country.

These points are mentioned primarily because I, too, then began to examine the ampules on the market. Very few of them stated that they were sterile. There was a statement as to contents—a solution of iron citrate, or a solution of morphine sulfate, or whatever the drug may have been. More recently the Sterile Advisory Board of the United States Pharmacopeia, of which I am a member, has become concerned with many of these sterile products.

Now we definitely define what parenteral means and, therefore, ampules and parenteral solutions must be sterile, whether labeled so or not. The Food and Drug Administration and the manufacturers accept this as such. The result is that this class of marketable products is sterile, and we have had practically no trouble on that score.

On the other hand, ointments are not sterile unless they are labeled sterile. I dare say there are very few ointment preparations on the market, whether used for ophthalmic work or for other surgical work, that are sterile. I have examined ointments in tubes and in jars and have found them to reveal the presence of bacteria.

The whole question of sterility is most intricate and complex. We must remember, of course, that the economic question affects the picture, although the question of price should not enter into the consideration if we want a finished preparation in which we have assurance that it is definitely sterile. When surgical catgut became official in the Pharmacopeia, members of our committee went on record to the effect that individual strands should be kept in individual hermetically sealed glass tubes. This form of marketing was first official in U.S.P. XII, and it is official in U.S.P. XIII, which recently made its appearance. At one time many strands of surgical catgut were in one container. This was objectionable and for many of the reasons which Dr. Lehrfeld presented here this evening.

In ointments we must remember many specific things. Dr. Lehrfeld has mentioned various ointments which, for the moment, one may think are bactericidal. However, we must remember that this is not always the case. The sulfonamides, for instance, are

only bacteriostatic. They are not bactericidal. They do not kill bacteria even if used internally, let alone in ointments.

One thing that we may forget is the fact that when we speak of bactericidal effect we seem to think that it means that every species of microörganism is killed. This is not so, although it may occur occasionally. The sulfonamides are only effective against certain particular groups of organisms. The same thing holds true for penicillin.

Even when a bactericidal agent is effective in suitable liquids, it may not be in ointments unless the proper base is used. In a petrolatum-phenol ointment, there will be very little antibacterial effect, but if a water miscible base is used, there will be an entirely different effect. These are some of the things which, of course, may play an important role.

With regard to the containers for ointments, I heartily endorse Dr. Lehrfeld's recommendation that, after surgery especially, a tube or container should be used only once in medicating an open wound. If an ointment is used in ophthalmic surgery, it certainly should be sterile. It is not a simple procedure, however, to market sterile ointments in small tubes or other individual containers if the expense has to be considered, because the process is an intricate, tedious, and long drawn-out one. The ointment tube itself, even those for ophthalmic use, are generally primarily tin. Some of them contain about three-fourths of one percent copper, added for hardening purposes. The larger tubes—½ oz., 1 oz., 4 oz., and larger —usually not used for ophthalmic products, are made of lead, lined with tin, about 7-percent tin; for toothpaste, 3-percent tin. Some of them may even have a plastic lining, but not the tubes for ophthalmic use.

It must be remembered that all tubes have to be sterilized. The ophthalmic tubes of pure tin with a small amount of copper can withstand heat up to 400°F. We use dry heat at 160°C. (320°F.) for sterilization. The closures are generally of Bakelite, which may hold up at this temperature. The individual sterile tubes then have to be filled under aseptic conditions with the sterile ointment. In many instances it may not be practical to sterilize the tube and contents or final containers. Individual sterile gelatine containers can also be used. The additional expense involved in the manufacture of sterile ointments must be kept in mind. Although the manufacturers will be delighted to cooperate in producing such preparations, you must remember what it will cost them.

The question has been raised as to whether or not a bacteriostatic agent can be incorporated in an ointment to produce a preparation that is self-sterilizing. Zinc peroxide has been mentioned. Zinc peroxide may be satisfactory, but in some instances you will find it possesses irritating effects, especially in the eye. Urea peroxide has been recommended for sulfonamide ointments, but frequently, upon standing, oxidation of the sulfonamide compounds occurs. The self-sterilizing agent must not only kill the bacteria present, but must also be nonirritating. A series of tests to prove that particular point will have to be conducted. Furthermore, one cannot just say that, because zinc peroxide, or urea peroxide, or whatever the agent may be is effective in combination with sulfonamide, it will be effective with other drugs. The question of effectiveness, stability, harmlessness, and so forth, are factors which must be taken into consideration.

It is possible to have individual containers for dispensing ophthalmic ointments and I, for one, definitely recommend and heartily endorse them. Certainly sterile preparations should be used for surgical purposes. However, unless requests are made specifically for sterile ointments, unless there is a demand for them, and unless individuals are willing to meet the additional expense involved, manufacturers will not market sterile ointments for use in ophthalmic surgery.

Dr. George J. Dublin. What I have to say is not relative to contaminated ophthalmic ointments, but rather to the effects of ordinary ophthalmic ointments, on the eye. I have noted for many years untoward re-

actions following the use of ophthalmic ointments.

These reactions were noted particularly in patients from whose corneas foreign bodies had been curetted. As usual, pontocaine or butyn ointment had been ordered. The corneal abrasion healed without much trouble, but I noticed that there were a considerable number of punctate staining areas over the cornea. These remained present for several days following the healing of the original corneal ulcer or corneal abrasion.

At first I thought that these abraided areas were due to some form of allergy. Later, the thought came to me that the punctate staining areas might be due to some form of mechanical irritation. We know that there is no ointment in which a drug is completely dissolved. Some of the drug always remains in crystal form. The small crystals within the ointment, by their mechanical action, cause corneal abrasions. I wondered at first why these patients complained of vague symptoms such as scratching, sensation of a foreign body, and tearing in the presence of a quiet eye, until I routinely stained each patient with fluoroscein. To my surprise, I found a great number of staining areas. To eliminate the possibility of these reactions being allergic in character, I used these ointments in the opposite eye, and noted the same reaction. I tried other types of ointments, and I found that, regardless of the type used, even boric-acid ointment, the same reaction was present in a majority of cases. I felt that an abraided cornea, the result of ophthalmic ointment, was an excellent medium for infection to develop. I reasoned that, instead of preventing an infection, I might be responsible for the development of a corneal ulcer. I have noted these reactions for several years, and consequently, I have not used ophthalmic ointments when I could possibly avoid them. In my opinion, liquid medication is equally efficacious, and probably it is considerably better to use it rather than ointments.

Dr. Louis Lehrfeld. I am very grateful to Dr. Gershenfeld and Dr. Dublin for their discussion. I should like to read part of a letter that was received by the pharmacist at the Wills Hospital following a question he asked as to whether ointment tubes were sterilized before ointment was inserted. The letter reads in part:

"We do not sterilize empty tubes except in the case of penicillin ophthalmic ointment where we use dry heat to sterilize empty tubes." Signed by Lanwermeyer, representing Abbott Laboratories.

Dr. Louis Gershenfeld (in closing). And this, in the case of penicillin, is the result of action by the Food and Drug Administration.

Vitreous infections and streptomycin

Dr. Irving H. Leopold, Dr. Richard Dennis, and Miss Marjorie Wiley, B.A. (by invitation), presented a paper on this subject which was published in the Journal, 30:1345-1352 (Nov.) 1947. A brief abstract follows:

Streptomycin penetrates poorly from the blood stream into the vitreous humor of normal rabbit eyes. Local methods of administrating streptomycin were studied and compared for their abilities to produce adequate vitreous-humor concentrations of streptomycin. Subconjunctival, anterior-chamber, and retrobulbar injection of streptomycin plus anterior-segment iontophoresis produced higher levels than that obtained by systemic administration. These methods were tried against the standard vitreous infections produced by bacteria coli.

Direct intravitreal injection of streptomycin, retrobulbar injection plus iontophoresis, and anterior-chamber injections reduced the severity of experimental vitreous infections due to bacteria coli. They were effective in the order listed.

Direct intravitreal injections of streptomycin produced retinochoroidal exudation and subsequent degeneration. In concentrations below 800 micrograms per injection, the damage was minimal and limited to the site of injection.

Discussion. Dr. Richard Dennis. I would

like to emphasize a couple of points and also add another. From the work that we have done, it seems that direct intravitreal injection is the most efficacious of the local methods of administering streptomycin. It also appears that the injection of reasonable quantities of streptomycin, at least up to 800 micrograms, can be done with no more damage than would follow a similar direct injection of saline solution. With improved methods in the refinement of production of the drug this will probably be more obvious. In a severely infected eye where other remedies have proved to be of no avail, the ophthalmologist would seem justified to try this method. For intravitreal injections, the solution should be as near isotonic as possible. In the lower concentrations this is best obtained by diluting the drug in physiologic saline. In higher concentrations, considerable osmotic effect occurs, and here it is best to dilute with distilled water.

Dr. Irving H. Leopold. For those who might try retrobulbar injections of streptomycin, it is necessary to point out that such injections may be painful. Intramuscular injections of streptomycin are painful to some individuals. Procaine does not interfere with the action of streptomycin, and could be used with or prior to retrobulbar streptomycin injections.

Role of the vertically acting muscles in concomitant strabismus

Dr. Edmund B. Spaeth presented a series of cases to illustrate the role which the vertically acting muscles must play in the causation of convergent as well as divergent strabismus. This is one basis on which to consider the etiology of strabismus. The cases illustrated a relationship between the conjugate muscles, with muscle overaction in one eye and with muscle underaction in the opposite eye. A degree of vertical deviation was always present but changed in each possible position of the lateral rotations. Further, muscle overactions were found to be quite common in the homolateral antagonistic muscles with and without contralateral conjugate muscle disturbances. The various possible combinations were all presented.

Disturbances in the vertically acting muscles modify to a marked degree the corrective surgery necessary. Certain rules for this were presented as to the sequence of the necessary operations (lateral and/or vertical) in the various situations seen.

Discussion. Dr. Glen G. Gibson. Once again we are deeply indebted to Dr. Spaeth for calling our attention to an extremely important and frequently neglected phase of ophthalmology.

The time has come when we can no longer neglect this subject of the vertical deviation in horizontal strabismus. I feel that this is an important paper for two reasons.

It is important, first, because it brings us intimately in contact with the author's extensive surgical experience in these very interesting cases.

It is also an important paper, because the literature in the past has been inadequate in guiding us in the handling of these cases. It illustrates the fact that we, as clinicians, are in need of precise definitions by which we can understand each other more thoroughly when we speak of such terms as spasm, overaction, vertical component, and vertical element.

This paper is too inclusive and extensive to permit a discussion of all the aspects of it, and I feel that I may best serve our purpose at the moment by summarizing briefly what Dr. Spaeth has really said.

He has pointed out that there are cases of pure horizontal deviation without any vertical element. He has also pointed out that if we study these cases carefully we can determine that many of them have a very slight degree of vertical imbalance, either hypertropia or hyperphoria. The careful study of these cases is rewarded by much better surgical result. There are two main groups in which we encounter combined vertical and horizontal tropias. The first group is primarily a concomitant strabismus

in which there is a secondary vertical deviation. The most common of these is the type in which there is bilateral inferior oblique overaction. The inferior oblique overaction is merely the secondary participation of these muscles in the esotropia. The second type of these cases are usually paralytic cases. These are primarily vertical deviations in which the horizontal deviation is merely the secondary device that the patient uses to get away from the disturbing diplopia that results in these vertical cases.

Now the differential diagnosis of these two types is relatively easy when we consider that the one in which the horizontal deviation is primary is the one in which the inferior oblique excess is bilateral. It is equal, and it is symmetrical. In other words both inferior obliques participate equally in these cases. In the cases which are primarily paralytic in origin, the deviation is always different in each eye. They are not symmetrical.

Now there is a third type of mixed deviation that one encounters in which the deviation has become so concomitant that it is impossible to tell just precisely which muscle was primarily involved. Some people will not admit that cases which were originally paralytic become progressively more and more concomitant as time passes, so that it is impossible to identify which is the originally offending muscle. I feel, however, these cases do occur and quite frequently. It is embarrassing to deal with these cases when it is impossible to say which of the muscles is primarily at fault. This is due to the fact that these paralytic bases become progressively more and more concomitant as time goes by.

Dr. Spaeth has called attention to the fact that the sensory correspondence is vitally important in these cases. I would like to cite two cases which illustrate this all important point. Two young men, aged 22 years, each had 10 prism diopters of left hyperphoria when measured in the primary position.

In the first case, the onset of the deviation was at the age of 22 years, in an individual who presumably had normal eyes and normal binocular vision until he was in an automobile accident, after which he developed a typical left superior oblique paresis. A complete myotomy, performed on the inferior oblique of the offending eye, reduced the hyperphoria to one-half prism diopter. This excellent surgical result with a relatively minor operation was possible because this young man had normal binocular sensory correspondence before the onset of the condition.

In the second case, the findings were essentially the same, but the history was entirely different, and a much greater surgical intervention was necessary. This was also a superior oblique case. The onset, however, was at two years of age, and we know, by inference, that the patient had very abnormal sensory correspondence and that the surgeon would get very little help from the binocular reflex in maintaining alignment. Even the deviation was essentially difficult. Although the diagnosis was the same as in the first case, a much more extensive surgical procedure had to be instituted because of the extremely abnormal sensory correspondence. A myotomy of the inferior oblique on the offending side, combined with a 3-mm. recession of the contralateral inferior rectus, was performed. The residual hyperphoria after the operation was three prism diopters, even though a more extensive procedure had been done. This is a point we must understand very thoroughly before interfering with these vertical cases—it is very important to know of the status of the sensory mechanism before operation.

Dr. Spaeth has called attention to the importance of recognizing inhibitional palsy in these cases. I agree with him that it is a very important point. They must be recognized. I would refer those who are not thoroughly familiar with this aspect of the subject to an article in the *Transactions of the American Ophthalmological Society* by Dr. Adler which is very clear on this particular subject. This condition is also explained

nicely but less clearly in the textbook of Chavasse. Dr. Spaeth has called attention to the fact that more than a cosmetic result is desired. The ideal sought is to obtain binocular vision, if possible.

A most important factor in obtaining binocular vision in these cases is the age at which surgery is instituted. It is not necessary to operate on these cases before the patients are three years of age, and, likewise, it is desirable to operate on them before they get past four years of age. In other words, the ideal time for surgery is between three and four years of age. Children treated at that time are still young enough to develop normal binocular vision. Dr. Spaeth has pointed out that, in this group of vertical disturbances associated with horizontal deviation, the results are frequently better than they are in the purely horizontal cases. It has also been my experience that we are much more satisfied with the surgery on the vertical muscles when the diagnosis and the treatment have been correctly performed.

Dr. George F. J. Kelly. I should like to ask Dr. Spaeth what his experience has been in cases of torticollis due to paralysis of an oblique muscle. When does the torticollis disappear after correction of the oblique muscle defect?

There is another point. If I heard you correctly, you said that when both a vertical component and a lateral component are present, whichever is the greater is operated on first. I also think I understood you to say that, when you correct the horizontal component, you always get an improvement in the vertical, and that, when you correct the vertical, you may get no alteration in the horizontal. Would it not be worthwhile to operate on the horizontal, because surely there will be some correction on the vertical, and maybe it would not be necessary to do so much on the vertical subsequently?

Dr. Edmund B. Spaeth (closing). Three things that Dr. Gibson brought out are, I think, quite true. The first emphasizes what White said right here on this floor many years ago: "Seventy-five percent of concomitant strabismus is accompanied by a vertical deviation." Too often nothing is done about it.

Dr. Gibson spoke about this matter of, "So many millimeters of recession or resection." This is more a delusion than a fact. There are many other things which enter into a vertical surgical situation. To correct vertical deviations by millimeters is quite impossible. It is disheartening to see the lack of results one will obtain in any type of surgery on an inferior oblique muscle when, instead of surgery on an inferior oblique muscle, one should have done the opposite surgery, resection or recession, upon the superior oblique muscle. It is only by a comparison of the total amplitude of the action of the conjugate yoke muscle to the muscle involved that one can decide whether an inferior oblique muscle or a superior oblique muscle should have been operated in these instances.

As to torticollis, there is no problem about this except that of the duration of time. If torticollis is not improved by monocular occlusion prior to the surgery, it will be a long-standing affair before the torticollis disappears.

As to the sequence of surgery in the vertical and horizontal, I have been distressed and embarrassed several times to find that subsequent surgery on the verticals has upset the previous surgical result on the laterals. If the vertical component is the greater, it is wise to take care of that before the lateral is even touched, because one cannot tell what certain effect this will have upon the lateral deviation.

George F. J. Kelly,
Clerk.

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SOCIETY PROCEEDINGS

One of the most attractive and popular features of the JOURNAL is that of "Society Proceedings." For a great many years, it has been a part of the JOURNAL to which the reader turns with the hope that something of utility, interest, and instruction will be forthcoming. Seldom has this hope been disappointed.

If properly reported, the society meeting can be easily visualized, as if you were there in person. The personality and experience of the essayist or demonstrator are displayed to advantage or disadvantage. Triumphs are scored, mistakes are revealed, and discussions, for the most part exceedingly shrewd and helpful, probe into the subject with acute discernment.

The proceedings, however, must not be taken too seriously or else the informality, that is so essential, is lost. You are permitted to theorize and speculate freely; something, perhaps, that is out of place in a formal presentation. You are also permitted to bring in personal experiences in discussing similar cases that you have had under observation,

without worrying too much about your style of delivery or the vocabulary you use. Questions are asked, and sometimes the answer is obviously avoided. All of these sidelights are reported in the proceedings, and it is necessary that they be reported, for otherwise the human touch is lost, and the spirit of the meeting and its spontaneity vanish.

Many times an opinion is expressed during a case report which throws a new light upon the subject, an idea that stimulates the reader's mind to elaborate more fully either in his own thoughts or, what is more significant, into action.

For example, in one of the meetings of the New York Society for Clinical Ophthalmology, Dr. Jack V. Lisman mentioned that the glaucoma associated with rubeosis iridis responds better to mydriatics than to miotics and thought that this is probably due to a mechanical squeezing out of blood from the capillaries of the iris as the pupil dilates. There is a great deal of food for thought here, and one should be stimulated by this to study further the problem of the control of such glaucoma.

Many other examples could be cited. As a matter of fact, if one went through all the society proceedings published in the JOURNAL during the last 10 years or more, and made a note of striking and unusual remarks, enough ideas for research would thus be engendered to keep one fully occupied for a long time.

The arranging and editing of the proceedings is a difficult task, skillfully performed by our Dr. Lyle. The form in which they are received often leaves much work to be done in order to make them readable without sacrifice of ideas, opinions, or individual style. The most important job, therefore, is that of the recorder or clerk of the society.

It is not every individual who has the knack of getting down on paper the essential matter presented at a meeting, and it is very easy to misquote or to leave out very interesting facts. Each society owes it to itself and to ophthalmology to give considerable thought to this factor and to choose with care one of its members for this important chore.

The large and wealthy organizations can hire a stenographer, but there is still work for the clerk in editing and coördinating the remarks. The smaller societies may not consider themselves able to afford the services of a professional stenographer. In this event, the entire burden falls on the clerk. For this reason, many organizations (and there are some 95 state and local ophthalmic societies in the United States) don't bother to keep a record of their meetings, or to send their proceedings in for publication.

This is a pity because many thoughts, ideas, and opinions are forever lost. The younger men who may hesitate to get up and discuss a paper before one of our national organizations, express themselves freely, as a rule, in their local meetings, and it is their fresh outlook and young ideas that we all need so badly.

It could probably be arranged, without increasing the dues too much, to hire a stenographer or to put in a wire recorder at every meeting of each society. The choice of a good clerk should not be too difficult, for in every community there is at least one individual who is qualified and eager to collect and to edit, perhaps in a preliminary fashion, the remarks that are made at a meeting.

The assignment is an important one. More organizations should be represented in the "Society Proceedings," and the JOURNAL will always welcome these contributions.

Derrick Vail.

THE VIRUSES

Vitamins and viruses were both discovered just 50 years ago, and in the intervening span few scientific revelations have so profoundly altered biologic thought. The first animal virus recognized—that of foot-and-mouth disease by Loeffler in 1898—is still the smallest yet identified. Since then virus infections have been found in every

form of life, including the lowly bacteria, and of the several hundred viruses now known, 35 affect man. No part of the ocular apparatus is immune, as the diverse complications of measles, mumps, and epidemic encephalitis illustrate. Certain viruses have a specific affinity for the eye only, as is apparent in trachoma and epidemic keratoconjunctivitis, and conceivably possible in sympathetic ophthalmia.

The mists of mystery about the viruses have cleared considerably. The term "filterable virus" is now dated. The size of virus particles has been accurately estimated through graded collodion filters, ultracentrifugation, and electron microphotography. The measurements range from 300 to 10 millimicrons. Progressive simplification in structure and function parallels the diminution in size. A group of the largest viruses, which includes psittacosis and the agents of lymphogranuloma inguinale, inclusion blennorrhea, and trachoma, have a close antigenic kinship, and are related to the rickettsiae in metabolism and staining qualities. Burnet, who maintains that all human viruses had a primary animal habitat, intimates that psittacosis continues the original strain while the others are specialized mutants. In contrast to the smaller viruses these exhibit some susceptibility to the sulfonamides, the ocular infections seemingly responding best to sulfacetamide (30 percent) locally used.

The viruses have descended presumably from a rickettsialike organism to their present state by successive extensions of their dependency upon the host. The virus group are obligate intracellular parasites who demand not only board and room, but digestion and respiration as well. With the delegation of more and more of their vital processes to the host cell, the viruses become smaller and smaller until the process of evolution in reverse arrives at the terminus, a gene-pattern molecule capable of reproduction only. The smallest viruses are not overmuch larger than the serum globulin molecule, which measures six millimicrons. Following the successful crystallization of the enzymes, urease by Sumner and pepsin by Northrop, Stanley, in 1935, demonstrated that a living virus, that of tobacco mosaic, could also be isolated in crystalline form. Since then numerous plant viruses have been so segregated; a typical example, the tomato bushy stunt virus, has been obtained in true 12-sided crystals absolutely homogeneous in size and shape, the particle diameter being 25 millimicrons; the molecular weight, 10 million; water of hydration, 70 percent. Like all virus molecules studied it is a complex of pure nucleoprotein.

The parasitized cells tend to react to the virus load by proliferation, but an excessive burden results in necrosis. In some virus diseases, as in the Rous sarcoma of hens, the hyperplatic response cannot be distinguished from neoplasm. Clinically the viruses can be roughly classified as pantropic, of which mumps is an example, dermatropic like herpes simplex, neurotropic like herpes zoster, and tumor forming like molluscum contagiosum and the common wart. The formation of inclusion bodies when present is pathognomonic of virus disease. These are colonies of elementary bodies, the infectious agent, which were first noted by Paschen in vaccinia and smallpox in 1906, and by Halberstädter and Prowazek in trachoma in 1907. By differential centrifugation the elementary bodies have been separated in purity, and, in 1931, Parker demonstrated that one elementary body could produce vaccinia. Thygeson removed all doubt concerning the role of the elementary bodies in trachoma by infecting a human volunteer solely with them.

An outstanding feat in virus control was the cultivation of sundry species on the chorio-allantoic membrane of the developing hen's egg by Goodpasture and Woodruff in 1931. From a yellow-fever virus serially transferred to chicken embryos from which the cerebrospinal system was removed, Theiler developed the invaluable strain, now known as 17 D, which although innocuous to man conferred complete immunity. This con-

ditioned mutant was in a way a fortunate accident, as the result has never been experimentally duplicated. Trachoma and inclusion blennorrhea are specifically human diseases, and their viruses cannot be grown in the chick embryo or animal tissues.

The viruses vary vastly in the antigenic response produced—from a solid immunity in herpes zoster to none in herpes simplex and trachoma. The first invasion of herpes is in the universally occurring aphthous stomatitis of childhood. The virus thence persists in apparent latency for life until spurred to activity by some factor, local or general, as the injection of typhoid vaccine or exposure to high temperature. Protection from viruses can be secured so far by prophylactic means only, which in order of effectiveness are active immunity, passive immunity, and quarantine. After the virus has penetrated into susceptible cells, it is safe from antibody attack, and serum injections then are of dubious value. As Rivers showed in 1929, if normal cornea is inoculated with vaccinia virus and then cultivated in antivaccinal plasma, typical lesions will nevertheless develop; while if the cells are bathed in immune serum before the addition of the virus, infection is prevented.

The successful treatment of virus diseases of the eye has been limited to sulfonamide medication in the psittacosis group, the removal of virus growths such as warts and molluscum contagiosum, and iodine cauterization of herpetic lesions. Viruses are not affected by ether and are destroyed by antiseptics with much greater difficulty than bacteria, for which reason 0.5-percent phenol can be used effectively as the standard preservative of vaccinia virus. The peculiar potency of iodine is probably due to its deleterious oxidizing activity. The viruses like the germinal cells are sensitive, too, to radiation. In experiments with herpes, Gundersen showed that ultraviolet rays are not the answer, nor probably are beta rays. In the eye, the local action of antiviral remedies can be easily observed. Now that radioactive isotopes are available, perhaps the proper radiation could be given by incorporating radioactive iodine in Cowen's solution and simply instilling the eye drops at proper intervals.

Numerous questions in regard to the local mechanisms of resistance to virus disease require solution. Why are some eyes more susceptible than others to the herpes and influenza viruses? Does the conjunctival secretion contain a substance capable of inactivating certain viruses? If so, it is probably something other than lysozyme. Why is the gastro-intestinal tract immune to virus infection? Is it because of the proteases and nucleinases present, and what action do these enzymes have on viruses? If virus disease is to be conquered, these problems among others must be resolved.

James E. Lebensohn.

A COURSE FOR ORTHOPTIC TECHNICIANS

Orthoptics as an important part of ophthalmic practice has become well established, after two earlier upsurges followed by recessions. It is an essential part in the intelligent treatment of many ocular muscle abnormalities, especially those associated with strabismus. Such opposition as there has been by ophthalmologists to orthoptics has been based largely on lack of understanding of its possibilities and limitations, furthered by disinclination to devote the necessary amount of time to this training and, to be honest, the disinclination to expend energy on meticulous and tedious work with uncoöperative and naturally unappreciative little children. Combine all of this with the recognized fact that complete success is the exception rather than the rule and that many cases prove, after much sweat and tears, to be quite unresponsive to treatment, and the reasons for the cold shoulders that many eye surgeons have turned to muscle and fusion training become obvious.

Granting that the practice of orthoptics is worthwhile and admitting that most oculists will not incorporate it into their personal activities, the obvious answer is the development of technicians. This has not proved easy. Few eye physicians were sufficiently conversant with the subject to be competent instructors and of those so qualified only a minimal number had the time, the facilities, or the inclination to give such teaching. Gradually, however, a small number of orthoptists, the earliest in the field being largely self-trained, became technicians in response to the demands of the ophthalmologists. There are as yet less than 100 certificated technicians practicing in the United States. By certificated, reference is made to certification by the American Orthoptic Council, which, coming into existence some 10 years ago, has sponsored and helped conduct examinations of those technicians desiring to take them who had met the preliminary requirements of the Council. The procedure is similar to that carried on for ophthalmologists by the American Board of Ophthalmology.

One of the principal difficulties for these prospective technicians, for whom there are of course no internships available for preliminary training, has been to get basic instruction and practical experience. This has been done in a somewhat unsatisfactory manner by university, clinic, and private preceptorships. Some students have received excellent ground work, others poor. There has been no uniformity. Not only has the training in many cases been sketchy, but it has been impossible to find enough places for the training of those desiring to study orthoptics. As a result there are not enough orthoptists for the ophthalmologists who wish to employ such qualified workers.

One step toward solution of this problem appeared to the American Orthoptic Council to be centralization of basic training preliminary to practical training. The former has been the more difficult to obtain, whereas there are many clinics, groups, and private offices where the latter can be learned, provided that a good foundation has been previously acquired.

Accordingly, largely through the efforts of Dr. Walter Lancaster, a course in fundamentals is to be given this year utilizing the facilities of Nasson College in Springvale, in the township of Sanford, Maine, June 28th to August 28th for prospective orthoptic technicians. The course will be under the direction of Dr. Lancaster who will also give an important part of the instruction. Among others who have generously volunteered to contribute an average of a week of their time to the program are Dr. LeGrand Hardy, who has undoubtedly done more than any other man toward the establishment of the American Orthoptic Council, of which for its first nine years he was president, and toward organizing the American Association of Orthoptic Technicians. He has given life and impetus to the entire program. On the faculty will be Drs. Adler, Swan, Costenbader, Regan, Beach, Burian, and Fralick. Tentative understandings have been arrived at with other ophthalmologists, but, because at the moment of writing the plans have not been completed, their names are omitted. Several widely known certificated orthoptists will be present to give lectures and individual instruction in the use of the special instruments that they employ.

Among the subjects included in this course are Anatomy, Physiology, Refraction, Optics, Diagnosis, and Treatment. Important also are courses in psychology, especially as applied to the child.

Following this two months' course, technicians will receive assignments throughout the country for their practical instruction which, at most places, will be for from eight to ten months. Thereafter, if their work has been satisfactory, they will be recommended for examination for certification.

The plan appears to be a sound one for unifying instruction and ultimately providing more technicians and should receive coöperation from ophthalmologists on whose

good will much of its success depends. The specifications of the course are published in "News Items" in this issue of the JOURNAL for the benefit of those desiring such information. It is anticipated that this course will prove such a success that it will be repeated annually.

Lawrence T. Post.

OBITUARY

CHARLES PORTER SMALL
(1863-1947)

Dr. Charles Porter Small was born at Bangor, Maine, November 16, 1863, the son of the Rev. Albion Keith Small and Thankful Lincoln Small. He died at Princeton, Illinois, September 25, 1947.

After his graduation from the Fall River, Massachusetts, High School in 1882, Dr. Small entered Colby College from which he was graduated in 1886. In 1889, he received his medical degree from Bowdoin Medical College and served a two-year interneship at the Maine General Hospital.

For two years, 1890 to 1892, he was in general practice at Waterville, Maine, but, in 1892, he came to the new University of Chicago and became its first physician in charge of student health.

Five years later, after preparation in Vienna, Dr. Small entered the field of ophthalmology and practiced his specialty in Chicago until his retirement nearly 40 years later. During these years, he was clinical associate of the Eye Department, Rush Medical College; clinical assistant, Northwestern University Medical School, and instructor in ophthalmology at the Chicago Polyclinic Hospital.

In 1914, Dr. Small became associated with Dr. Casey Wood, both in the practice of ophthalmology and in the editorship of the *Ophthalmic Record,* of which he was the secretary-treasurer. This publication was absorbed by the *American Journal of Ophthalmology* in 1919. Dr. Small was also a collaborator on the *American Encyclopedia of Ophthalmology, the Ophthalmic Yearbook,* and editor of the Eye Section of the *Practical Medicine Series.*

During World War I, Dr. Small served as a captain in the Aviation Examination Unit and was stationed both at Rock Island, Illinois, and Washington, D.C.

Dr. Small was a member of the American Medical Association, the Illinois State and the Chicago Medical Societies, the Physician's Club, Delta Kappa Epsilon, Phi Chi, and the Chicago Ophthalmological Society of which he was president in 1925.

E. V. L. Brown.

CORRESPONDENCE

CONCERNING DR. VAN HEUVEN

Editor,
American Journal of Ophthalmology:

On occasion of your report of Dr. van Heuven's speech at the January (1947) meeting of the Cleveland Ophthalmological Club (Am. J. Ophth., 30: 535 (April) 1947) I want to declare:

On the contrary, Dr. van Heuven's political feelings during the German occupation were very ambiguous. In the course of the occupation, he secretly subscribed to the Nazi-organization of Physicians (Nederlandts Artsenkamer). Furthermore, he published scientific articles in German journals (Zeitschrift für Psychologie und Physiologie der Sinnesorganen).

For these and other reasons his name was struck out from the list of the Dutch Medical Association after the liberation and to escape difficulties, he withdrew his name from the Dutch Ophthalmological Society.

(Signed) G. H. Jonkers,
Former Medical Staff Officer,
Dutch Underground Forces,
Utrecht, Holland.

Corneal transplantation: Truth and myth

Editor,
American Journal of Ophthalmology:

"A unique case of Elschnig, reported by Ascher, was cited of a 12-year-old boy whose one eye suffered from deep keratitis. The cornea of this eye was trephined without receiving a graft. After seven years, the defect was replaced by completely transparent tissue."

This I read in the excellent paper by Katzin and Kuo in the February issue of the Journal, and I felt as if I were dreaming. Never had I heard of such a case; so, I went over my old publications and found on page 352 of the 1919 paper, quoted by Katzin and Kuo, their description as translated in the Journal but with a headline saying in italics that this was a lamellar keratectomy; that is, a removal of the uppermost layers of the corneal parenchyma with preservation of the deeper strata. From the authors' quotation, however, it seemed to be a penetrating, not lamellar, trephination without replacement of an implant.

Elschnig's original, but always highly conscientious indications, never would have arrived at such a hazardous procedure. Even then, the operation quoted by Katzin and Kuo was a beautiful result and, most probably, the first successful lamellar keratectomy ever performed. How happy would Elschnig be to see that "his" corneal transplantation for which he fought through five lustrums, finally has been recognized as a useful procedure in well-selected cases, and is not just a fancy of a periculant imagination; that even his indications and contraindications essentially prevail.

A minor error in the quotation of the recent authors is that they located my histologic investigations in the 1919 clinical paper; the publication about the histology of keratoplasty appeared four years later, in Graefe's Arch. f. Ophth., 111:446-459, 1923.

(Signed) K. W. Ascher,
Cincinnati, Ohio.

Ophthalmic findings for and against sympathectomy for hypertension

Editor,
American Journal of Ophthalmology:

There is a wave of "jitterbug" surgery spreading through the large medical centers of the United States purporting to give relief by surgery from symptoms incident to hypertension. Thoracolumbar sympathectomy is one of the spectacular new-style procedures.

The ophthalmologist is especially concerned (or was at least concerned yesterday) in this new life-saving phenomena, because it is necessary that he classify the fundus findings into the artificial and arbitrary grading of Keith and Wagener, who designated four grades of vascular disease.

If the arteriolar changes in the eyes of the patient are graded in the first two groups indicating a very mild or a mild-plus type of sclerosis without any hemorrhages, then the patient is a good risk for sympathectomy in one or two stages, the operation being subdiaphragmatic or transdiaphragmatic or combined subdiaphragmatic and superdiaphragmatic. The surgeon has his choice depending upon how much courage he has.

In recent months, sympathectomy for the relief of hypertension has been recommended to include all stages of retinal arterial disease, regardless of the experience and objections of the older ophthalmologists who know that young adults with hypertension, associated with explosive vascular changes and including fluid and cellular infiltration of the optic nerve, are doomed to live a very short life.

Smithwick was first inclined to confine sympathectomy to moderate grades of arterior changes in the retina. Bolder surgeons are claiming results in cases of advanced retinopathy.

Dr. Arthur Bedell delivered a very splendid paper at the Philadelphia College of Physicians on January 21, 1948, proving by case records that sympathectomy was a dangerous operation in patients exhibiting a retinopathy

having grades three and four of vascular and retinal changes. Despite this experience, it was brought out in discussion by two surgeons present that sympathectomy might be extended to advantage to all grades of retinal destruction.

In the June (1947) issue of the *Pennsylvania Medical Journal* is a report by John Wesley Shirer, Pittsburgh, indicating that there is a possibility of prolonging the life of patients regardless of the stage of vascular disease as found in the retina.

Recently I treated a woman for hypertensive retinopathy associated with choked discs of both eyes accompanied by multiple vascular ruptures. The medical consultant insisted upon a sympathectomy on the grounds that my patient, who is now 50 years of age, might live five years longer. I refuse to accede to his recommendation. The patient is still living and comparatively happy to date.

Another patient seen by me in the past month, a young man in his early forties, has a malignant hypertension accompanied by definite kidney damage and retinal changes of an advanced type showing edema of the discs and tremendous retinal hemorrhages and star figures. Much against my advice a sympathectomy was performed on the patient a few weeks ago. At this present moment he is convalescing and the outcome is guarded.

Several years ago, two cases of sympathectomy performed for retinitis pigmentosa were reported at the Philadelphia College of Physicians. One of these patients recently applied to me for certification for blind pension. One does not read much in the literature today about sympathectomy for retinitis pigmentosa.

In my student days there was a Dr. Janesco, a foreigner who came to this country to display his skill in the treatment of glaucoma by cervical sympathectomy. Of course no one performs this operation for glaucoma today. Spectacular surgery has its day in print like Cueism and Mesmerism.

The point of issue is that the ophthalmologists should not be easily persuaded by the surgeons to recommend surgical intervention in cases of hypertension of long standing with extensive retinal damage. Merely reducing the pressure for the patient by a serious surgical procedure at a time when that patient is critically ill is neither wise nor logical.

I doubt whether anyone wishes to live or to have death postponed when there is present a constant threat of hemiplegia, coronary disease, or renal disease developing at a later period, incapacitating him to a life of invalidism. Unless the patient can be given reasonable assurance of his ability to return to a normal way of feeling, thinking, and acting, then the surgeon should not recommend such a serious operation as sympathectomy which is but a temporizing procedure.

We older ophthalmologists should hold to our philosophic point of view that just living is not life. When surgeons give statistics to the effect that the patient may live five years or more, we oldsters, in turn, should ask whether that patient will live a normal life or merely live every day in fear that he may not be able to reach the other side of the street.

I wish to join with Dr. Bedell and all other ophthalmologists who have had years of experience in recognizing the inescapable and not reversible path of certain systemic diseases as reflected in the eyes.

Miraculous things are happening in medicine, but these are principally in the field of preventive medicine. No one wishes to discourage the young surgical scientist from trying something new, but at no time must he achieve that aim by hastening the end by one minute, or by prolonging life for five years or more, when that is attended by mental suffering.

He must not play with God.

(Signed) Louis Lehrfeld,
Philadelphia, Pennsylvania.

Appeal for donations of slitlamps and other instruments for China

Editor,
American Journal of Ophthalmology:

For the past several years a nationwide campaign has been carried on in China to combat trachoma. This is largely supported by the National Blind Welfare Association whose sister organization in the United States is the Institute for Chinese Blind, 156 Fifth Avenue, New York City. The former secretary of the campaign organization, Dr. Pang Hsien Chen, writes that the need for instruments and supplies is most urgent. Six centers and 21 full- and part-time clinics have been set up in Free China but such equipment as slitlamps, ophthalmoscopes, operative instruments, tonometers, microscopes, and so forth, are lacking. Accordingly, the Howe Library of Ophthalmology is acting as a clearing house for the sending of available material to China. It is hoped that those ophthalmologists, and others, who have used slitlamps or other ophthalmologic equipment which they care to part with for this purpose, will contact us and arrangements will be made, so long as funds for transportation become available, to send them to China. All communications should be addressed to Miss Jeanette Loessl, Howe Library of Ophthalmology, 243 Charles Street, Boston, Massachusetts.

(Signed) David G. Cogan,
Boston, Massachusetts.

BOOK REVIEWS

CLINICAL NEURO-OPHTHALMOLOGY. By Frank B. Walsh, M.D., F.R.C.S. (Ed.). Baltimore 2, Maryland, Williams & Wilkins Company, 1947. Clothbound, 1,532 pages, illustrated. Price, $15.00.

It is impossible to do justice to a 1,500-page text in a brief review. Naturally one could not read the whole of it without delaying the review unduly. It is understandable that such an ambitious undertaking as the composition of this treatise required 10 years as the author tells his readers in his foreword. Furthermore, the accomplishment over so long a period must have entailed frequent rewritings even before the book was finished because of new material available during that time.

Examination of the table of contents which in itself covers 15 pages reveals the wide scope of this book and the many ramifications which are included. The first 90 pages are devoted to the visual pathways; their anatomy; descriptions of lesions in various parts of these nerves and tracts and the resulting disorders. Chapter two, of 60 pages, covers the anatomy and pathology and topical diagnosis of the other cranial nerves that have some relation to vision.

Throughout the book there is a multiplicity of illustrative cases, perhaps the most fascinating part of a fascinating book. One gets started on a subject and can lay the book down only with great reluctance.

The wealth of material would be unbelievable if it were not realized that, because of the size and importance of the Hopkins group of hospitals, much of the most unusual clinical material in our country finds its way through those doors.

The chapter on "Infections and Parasitic Invasions of the Nervous System and Their Ocular Signs, Including an Outline of Nervous System and Ocular Syphilis" covers almost 200 pages, the latter "inclusion" occupying about 80 pages. The frequent mention of numbers of pages is cited to impress upon the mind the completeness of this textbook, and it must be taken into account that the convenient two-column form is used, the pages are large, and the print easy to read. Many beautiful illustrations help to clarify and dramatize the text. Most of these cuts are from photographs although there are also excellent line cuts.

As is to be expected, "Tumors and Related Conditions" cover about one sixth of the book. The Johns Hopkins Hospital has been

traditionally a Mecca for the study and treatment of intracranial neoplasms since the pioneering work of Cushing and his famous successor, the late Dr. Dandy, has attracted there an abundant wealth of this material.

The reviewer is impressed with the extensive references. The author obviously did an enormous amount of collateral reading to make the book different from other texts on this subject. This and his own personal observations make the book a pleasantly intimate one.

The principal adverse criticism has chiefly to do with the size and weight of the book which is very difficult to handle. One keeps asking himself why not the same material in two volumes.

There is an excellent index of over 100 pages, the compilation of which alone must have required endless hours.

In summary, this is a wonderful reference book and, in addition, is so interestingly written that many pleasant hours can be spent rambling through its pages with only the thought of diversion.

Lawrence T. Post.

TRANSACTIONS OF THE OPHTHALMOLOGICAL SOCIETY OF AUSTRALIA. Volume IV, 1944, and Volume V, 1945.

After three years the Ophthalmological Society of Australia has again published a record of its meetings. In a group of essays various aspects of industrial ophthalmology are discussed. E. C. Black records some observations on the eye injuries of railway employees and considers methods of preventing them. L. D. Wright and A. L. Tostevin call attention to the importance of lighting in eyesight conservation.

Several papers deal with tropical ophthalmology. It is pointed out that there is an increased incidence of herpes-simplex keratitis in a population heavily infected with malaria but that there is little likelihood of precipitating a dendritic ulcer in a single case of therapeutic malaria.

J. Bruce Hamilton contributes an important analysis of tuberculous lesions of the eye. Among others, phlyctenulosis, Eales's disease, and heterochromic cyclitis are supposed allergic tuberculous eye infections. Three contributions add further clarity to the problem of congenital defects in infants following maternal rubella. An extensive and valuable analysis of crossed cerebral dominance is contributed by J. Ringland Anderson and Celia Weigall. Problems arise from the presence of a master hand and a master eye on opposite sides, and understanding of this condition is of the greatest importance in the management of diplopia and strabismus. The entire essay should be read.

In Volume V of the year 1945, C. G. McDonald contributes a comprehensive discussion of diseases of the arteries and their relationship to the eye. A table of salient facts makes perspicuous the corresponding names in pathologic classification, clinical classification, and clinical manifestation. This long discussion holds little that is not well known to the ophthalmologist about the fundus but presents with the utmost clarity the knowledge of internal medicine which is of the greatest use to the ophthalmologist in understanding processes of which he himself observes only a part.

The remainder of the volume consists of short interesting essays on a great variety of topics. There are several papers on phases of cataract extraction, one on ocular manifestations of malnutrition in returned prisoners of war, one on toxoplasmosis, one on sarcoidosis, and one on traumatic monocular glaucoma. The author of the last-named reports 18 cases and believes it to be a clinical entity which is conspicuously absent in ophthalmologic literature.

F. H. Haessler.

TRANSACTIONS OF THE SOCIÉTÉ BELGE D'OPHTHALMOLOGIE. No. 2. Jubilee meetings of September 28, 29, and 30, 1946, pp. 1-175.

This memorial volume opens with a short history of the Société Belge d'Ophthalmologie and its most famous members. It also contains many interesting and original papers. M. Alaerts reports on the human eye in the works of art. In discussing several of the most famous paintings, the author demonstrates the importance of the positions of the eyeballs, the lids, and their surroundings and stresses the variations in the expression of the face by making the most minute changes in the position of any of those structures. These facts are especially instructive for surgeons who not only intend to correct deformities or vicious scars but who also try to give to their patients a pleasant appearance, more compatible with their social life.

Beauvieux discusses the apparent blindness of the new-born, the gray pseudo-atrophy of the optic nerve. The author considers it to be a transitory congenital malformation, namely, a late development of the myelin-sheaths of the optic pathways. The prognosis is much more favorable than that of permanent blindness in retinal atrophy, which has comparatively small disc changes or disseminated chorioretinitis of syphilitic origin.

F. W. Law (London) reports on ophthalmic experiences and achievements during the war years. Zeeman describes his investigations of disturbances of the posterior ciliary arteries. Amsler emphasizes the increasing importance of diagnostic anterior-chamber paracentesis, the chemical and cytologic examination of the aqueous, the fluorescein test, and the quantitative grading of the Tyndall-phenomenon in clinical work. Those tests, although still incomplete, should lead to a better knowledge of the inadequately known vegetative functions of the eye.

G. Renard reports three case histories on sympathetic ophthalmia cured by subconjunctival injections of a 33-percent solution of a sulfonamide in increasing doses. E. Wolff recommends daylight in slitlamp examinations of precorneal films. G. P. Sourdille discusses such technical details in corneal transplants as retrobulbar alcohol injection in hypertension, iridectomy to prevent secondary adhesions, and the advantages of a light-weight trephine. H. Mantiulio surveys his and other authors' experiences on nicotinic acid as a retinal vasodilator.

Mme. S. Schiff-Wertheimer and Le Menn studied the relationship of retinitis proliferans and retinal detachment and they distinguish three different groups which not only differ in their clinical picture but also in their reactions to surgery and to clinical and anatomic cures. G. Renard presented four patients with central retinitis, apparently of tuberculous origin, characterized by the delicacy of the retinal lesions, the severe disturbance of vision, and the complete spontaneous recovery.

Alice R. Deutsch.

ABSTRACT DEPARTMENT

EDITED BY DR. F. HERBERT HAESSLER

Abstracts are classified under the divisions listed below. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. Anatomy, embryology, and comparative ophthalmology
2. General pathology, bacteriology, immunology
3. Vegetative physiology, biochemistry, pharmacology, toxicology
4. Physiologic optics, refraction, color vision
5. Diagnosis and therapy
6. Ocular motility
7. Conjunctiva, cornea, sclera
8. Uvea, sympathetic disease, aqueous
9. Glaucoma and ocular tension
10. Crystalline lens
11. Retina and vitreous
12. Optic nerve and chiasm
13. Neuro-ophthalmology
14. Eyeball, orbit, sinuses
15. Eyelids, lacrimal apparatus
16. Tumors
17. Injuries
18. Systemic disease and parasites
19. Congenital deformities, heredity
20. Hygiene, sociology, education, and history

5

DIAGNOSIS AND THERAPY

Cattaneo, D., and Carlevaro, G. **An ophthalmodynamometer for the measurement of the pressure in the ciliary vessels.** Ann. di ottal. e clin. ocul. **72**:711-718, Dec., 1946.

The instrument described and pictured is like the familiar impression tonometer in general construction and appearance. The aluminum plunger works against two opposing springs so adjusted that the curve of variation for the different weights is as rectilinear as possible. This system of compensating springs makes it possible to shift the range of measurement, which is about 50 mm. Hg, to the interval required in the individual case. Instead of the footplate of the tonometer there is a totally reflecting prism, the surface of which measures about two square millimeters and is slightly curved to fit the sclera. With the aid of a loupe the examiner may observe the obliteration of the blood column in the vessels when the prism is applied to the eye. The instrument may also be used for measuring the pressure in the retinal vessels.

Seidel's and Duke-Elder's observations with respect to ophthalmodynamometry are reviewed, and an attempt is made to establish criteria for evaluation of the measurements obtained.

Harry K. Messenger.

Clark, W. B. **Local use of "sulfamylon" (Para-[aminoethyl]-benzene sulfonamide hydrochloride).** Arch. Ophth. **38**:682-683, Nov., 1947.

Clark reports favorably on the use of "sulfamylon" in controlling contaminations with B. pyocyaneus. In no case was a sensitivity to the drug encountered.

R. W. Danielson.

Gilbert, W. **The prophylaxis and treatment of expulsive hemorrhage.** Klin. Monatsbl. f. Augenh. **112**:149-156, 1947.

General and local lesions in the blood vessels and hypertension of at least 180 mm. predispose to expulsive hemorrhage. These conditions are frequently combined with high myopia and sometimes with other abnormalities of the eye such as corneal opacities or glaucoma. The danger lies in the opening of the vascular channels as well as in the sudden release

of the intraocular pressure. The author advises a preparatory iridectomy and venesection immediately before the cataract operation itself. The second eye of a patient who lost one eye through expulsive hemorrhage may be trephined prophylactically in the equatorial region of the bulbus. Posterior trephining in combination with venesection and a large conjunctival flap may sometimes save an eye that is undergoing an expulsive postoperative hemorrhage. Most eyes are, however, lost and prophylaxis is the most important factor. (20 references.)

Max Hirschfelder.

McGuire, W. P. **A corneal scissors.** Am. J. Ophth. **31**:217, Feb., 1948.

Selinger, Elias. **Iontophoresis with contact lens type and eyecup electrodes.** Arch. Ophth. **38**:645-653, Nov., 1947.

Selinger discusses the theory of ion transfer and the technique of using his instrument. In order to drive the proper ions into the tissues, one should know whether one wants to carry the ions with the positive or with the negative electric charge. The electrodes are then arranged in such a way that the flow of the current is through the tissues of the eye toward the indifferent electrode held in the hands.

A list of drugs arranged according to the polarity of the electrode to be used is given. Since iontophoresis causes a concentration of ions in the tissues and also prolongs the action of drugs, only weak solutions should be used. The following concentrations of the drugs have been found effective by different authorities: penicillin, 1,000 Oxford units per cc.; sulfonamide drugs, 5 percent; atropine, 0.25 percent; pilocarpine, 0.1 percent; acetylcholine, 1:400; quinine salts, 0.5 percent; calcium salts, 0.5 percent; epinephrine, 1:20,000; zinc sulfate, 0.25 percent.

R. W. Danielson.

Valerio, Mario. **Advantages of the combined use of heparin and dicumarol in the treatment of thromboses of the retinal veins.** Ann. di ottal. e clin. ocul. **72**:719-725, Dec., 1946.

Heparin acts rapidly and briefly, and must be given intravenously. The action of dicumarol is preceded by a period of latency but is prolonged. Dicumarol may be given orally, and is much more economical than the very costly heparin. By the combined use of the two a maximal effect can be obtained promptly, and the required concentration of prothrombin in the blood can be maintained more readily than by the use of either drug alone.

Anticoagulant therapy is the treatment of choice in thromboses of the central retinal vein, but the dosage must be carefully regulated and the treatment prolonged. Treatment must be started early if good results are to be expected and sometimes should be supplemented with roentgenotherapy.

Harry K. Messenger.

6

OCULAR MOTILITY

Ambrose, Anthony. **Diagnostic muscle chart for determination of tropias, phorias, diplopia and muscle action.** Arch. Ophth. **38**:681, Nov., 1947.

A chart is presented for use in the determination of tropias, phorias, diplopia and extraocular muscle action.

R. W. Danielson.

Berke, R. N. **Tenotomy of the superior oblique muscle for hypertropia.** Arch. Ophth. **38**:605-644, Nov., 1947.

Berke discusses the operations that have previously been devised for relief from overaction of the superior oblique, and concludes that the condition is best treated by tenotomy or tenectomy of the offending muscle. This operation is best done under Tenon's capsule on the nasal

side of the superior rectus according to the technic here described. For adults local anesthesia is sufficient. For children a general anesthesia is necessary. Simple tenotomy will produce from 5 to 10 degrees of correction. A tenectomy will produce from 10 to 30 degrees of correction, depending on the amount of tendon removed and the amount of overaction present. This operation does not produce paralysis if the sheath is not severed with the tendon.

In the past nine years, 20 tenotomies or tenectomies were done on 13 consecutive patients. In none of these patients was a discernible weakness of the superior oblique muscle produced. In four out of ten tenotomies the tendons were presumably incompletely severed and the results were unsatisfactory. In all the tenectomies the result was good. (13 case reports are given.)

R. W. Danielson.

Candler, R. G. **The response of personnel affected by head injury to orthoptic treatment. Tr. Ophth. Soc. U. Kingdom 65:57-63, 1945.**

The author states that experience supports the view that orthoptic treatment provides a helpful background for recovery in defects of convergence and accommodation. The psychological approach which is possible with the treatment provides valuable help in the restoration of visual confidence for those patients with temporary paresis of extrinsic ocular muscles. Beulah Cushman.

7

CONJUNCTIVA, CORNEA, SCLERA

Almeida Reboucas, J. **Corneal ulcer from diplobacillus liquefaciens (Petit).** Rev. brasil. oftal. **6**:87-99, Dec., 1947.

After describing the characteristics of this organism, the author relates a clinical case in a man of 27 years. A corneal ulcer was successfully treated with subconjunctival injection of penicillin dissolved in a 2-percent solution of novocaine, supplemented with 7-percent sodium sulphathiazole and 5-percent ointment of the same drug. The author distinguishes the Petit diplobacillus from the Morax-Axenfeld. With the former, corneal ulcer is always primary. The organism liquefies gelatin, grows abundantly on plain agar at ordinary temperature, and does not produce acid with the sugars. (References.) W. H. Crisp.

Bietti, Giambattista. **Results of penicillin therapy of trachoma.** Boll. d'ocul. **26**: 209-226, April, 1947.

One hundred and fifteen patients received calcium or soduim penicillin, most of them an ointment containing 500 to 1000 Oxford units per gram, which was applied 4 to 12 times each day. Previous to, and during the medication, scrapings from the conjunctiva were searched for inclusion bodies and for evidence of secondary infection. The latter disappeared within 2 to 4 days after therapy started; the trachoma bodies took longer to disintegrate. The patients felt a definite relief after 24 hours; the conjunctival discharge regressed before the sixth day. Papillary hypertrophy and the typical granules receded slowly. Frequency of application enhanced the amelioration. In 43 cases of fresh trachoma, complete or almost complete healing was observed after 135 to 200 days of treatment. General treatment with sulfa drugs was followed by improvement in 10 patients of this group when penicillin had failed. For corneal complications penicillin was superior to the sulfa drugs. Xerophthalmia was favorably influenced as long as the therapy lasted. No untoward reactions were encountered in the whole group.

The prophylactic significance of this treatment is stressed. (5 photomicrographs.) K. W. Ascher.

Colenza, Domenico. **Marginal degeneration of the cornea.** Boll. d'ocul. **26**:254-269, April, 1947.

Two cases of marginal corneal dystrophy, one of them coincident with a unilateral herpes zoster are reported. This lead the author to assume a neurodystrophic etiologic factor to explain this rare degenerative corneal disease. (Extensive bibliography.) K. W. Ascher.

Giardini, Aniceto and Farina, Luigi. **Conjunctival microsporid in the course of inflammatory cutaneous microsporia.** Ann. di ottal. e clin. ocul. **72**:690-698, Nov., 1946.

The authors describe an acute conjunctivitis in the left eye of a 9-year-old girl who for two months had had an inflammatory microsporia on the back of her right hand. The conjunctivitis was characterized by typical lymphatic follicles localized predominantly in the lower cul-de-sac and by vesicles and hypertrophied papillae on the upper tarsal conjunctiva. Numerous eosinophils were found in smears, but no fungi or pathogenic organisms in either smears or cultures. Inclusion bodies were sought but not found. Microsporum lanosum was recovered from the lesion on the hand. A subcutaneous injection of trichophytin produced a generalized reaction, a focal reaction at the seat of the skin lesion, and a marked accentuation of the conjunctival manifestations. A second injection (for therapeutic ends) was followed in addition by a conjunctivitis in the right eye, which previously had been normal.

The skin lesion regressed under local treatment and with subcutaneous injections of trichophytin, and healed within twenty days. The ocular lesion also regressed, but a little more slowly. The eye was normal after forty days. It had received no local treatment other than irrigations with physiologic salt solution twice a day.

On the basis of the data pertaining to this case and of the very few similar cases reported in the literature the authors regard the conjunctival lesion as a microsporid, that is, a localized manifestation of an allergic state directly dependent on a mycotic focus in the skin.

Harry K. Messenger.

Katzin, H. M., and Kuo, P. K. **Histologic study of experimental corneal transplantation.** Am. J. Ophth. **31**:171-190, Feb., 1948. (16 figures, 2 tables, 47 references.)

Law, Frank W. **Treatment of corneal nebulae by contramine.** Tr. Ophth. Soc. U. Kingdom. **65**:173-179, 1945.

The author reports on the experimental work that Col. W. W. Jeudwine had carried out before his death. The work was so nearly completed that it was considered wise to report the results.

Contramine is the carbon disulphide product of di-ethylamine. The drug acts by virtue of its sulphur atom which has the effect of dispersing protein which has undergone the abnormal chemicophysical changes of dehydration and rehydration. The dispersion effected has an influence in causing the dissolution of fibrous tissue in the process of formation. The action is stated to be directly upon the protein in the blood, which is contracted and causes a diminution or disappearance of the lesions and manifestations. The preparation is toxic if the protein becomes overcontracted as a result of overdose.

Treatment is carried out with a small dose of 0.025 gm. to 0.125 gm. Six weekly injections constitute a course and four courses were given with an interval of

three months between courses. Twenty-five patients were treated and a table of the vision before and after treatment is included.

Six patients with recent corneal nebulae showed definite improvement and five of the nineteen with long standing conditions showed definite improvement, seven showed no improvement, five showed an improvement of one line, three of two lines and one of three lines on the Snellen chart.

The author concludes that the cases presented are not truly relevant but do provide adequate reasons for further trial. (2 tables.) Beulah Cushman.

Lordan, J. P. **Ophthalmological progress: sight restoration by corneal transplant.** California Med. **68**:90-94, Feb., 1948.

The author surveys the early literature on the subject and reviews the present knowledge. The advantages of the different methods of keratoplasty are summarized and the technique of handling donor tissue is described. The establishment of eye banks has greatly facilitated the procurement of suitable graft material. O. H. Ellis.

Nairac, M. L. **An unusual case of symmetrical, bilateral, non-traumatic iris prolapse.** Brit. J. Ophth. **31**:700-702, Nov., 1947.

On the Island of Mauritius, a young Negro woman complained of a sudden burning pain in the right eye followed by a fluid discharge. The following day the left eye became similarly affected. Pain and photophobia were intense. She was first seen two weeks later when each eye presented a large staphyloma in the upper quadrant. The pupils were irregular and drawn up. There were no signs of injury or even of any inflammation. The pupils dilated well to atropine. After cauterization with the electric cautery (the left bleb ruptured during the process) and covering the defects with thick conjunctival flaps healing occurred uneventfully. The most probable etiological explanation is that acute conjunctivitis with corneal ulcers was present and that these were ruptured by blepharospasm and rubbing. The curious aspect was the absolute symmetry of the lesions.

Morris Kaplan.

Rosso, Silvio. **Retrobulbar alcohol injections: indications, therapeutic action, and possible applications in postoperative complications of keratoplasty.** Ann. di ottal. e clin. ocul. **72**:671-678, Nov., 1946.

Because of an early iritic reaction (photophobia, lacrimation, ciliary injection) following keratoplasty a patient was given a retrobulbar injection of 40 percent alcohol about ten days postoperatively. The irritation was relieved, and about three weeks later when the bandage was removed the cornea was clear; two months later the vision was nearly 10/10.

Another patient, who had previously had an unsuccessful keratoplasty, underwent a second operation of the same kind. For two weeks the transplant remained clear, but then became cloudy, and there was a rise of ocular tension. Two retrobulbar injections of 60 per cent alcohol were given at an interval of 12 days, and six weeks later the transparency of the graft was satisfactory.

An alcohol injection gives rise to anesthesia or hypesthesia, vasodilatation, and hypotension, alters the osmotic pressure of the blood and of the tissues, and causes dehydration. If injected into the region of the opticociliary nerves the alcohol causes temporary lowering of the ocular tension. Likewise vasomotor reactions produced by alcohol seem to mobilize those histiocytic elements which participate actively in the repair of corneal lesions. Because of the sedative effect of the alcohol the graft is exposed to less risk.

The strength recommended is 40 percent and one cc. is considered sufficient.

Harry K. Messenger.

Sydenstricker, V. P., Hall, W. K., Bowles, L. L., and Schmidt, H. J. **The corneal vascularization resulting from deficiencies of amino acids in the rat.** J. Nutrition **34**:481-487, Nov. 10, 1947.

Rats of the Wistar strain were divided into control and deficiency diet groups. Quite regularly the first sign of ocular reaction to deficiency of amino acids or of protein is congestion of the scleral conjunctiva and engorgement of the limbal plexus. Following soon after this is slight thickening and diffuse corneal clouding, probably due to edema. Capillary "sprouts" shoot from the marginal limbal vessels. Diffuse nebular corneal opacities were seen in some. Phenylalanine, violeucine, threomine, valine, and arginine deficiency diets resulted in vascularization of the cornea. Protein-low diets in which any one of the ten essential vitamins is absent may result in vascularization of the cornea in the rat. F. M. Crage.

8

UVEA, SYMPATHETIC DISEASE, AQUEOUS

Esente, Ivan. **On a case of a mesodermal cyst of the iris in an eyeball with a previous perforating wound of the cornea.** Ann. di ottal. e clin. ocul. **72**:597-609, Oct., 1946.

A case of a serous mesodermal cyst of the iris in the right eye of a 39-year-old man is described. Four years before the cyst was discovered the cornea of the affected eye had suffered a small perforating wound in the part overlying the cyst. Pathologic examination showed that both the inner and outer walls of the cyst were lined with endothelium, hence its truly mesodermal nature. For an explanation of the pathogenesis of the cyst Esente favors the theory of Hosch (1874), according to which trauma may result in obstruction of a crypt of the iris and thus cause a retention cyst, especially, adds Esente, in an eye such as this, which was genetically imperfect, as shown by extensive congenital pigment deposits on the anterior capsule of the lens and by the anomalous ("spherular") character of the pigment border of the iris.

The literature of iris cysts and their pathogenesis is reviewed at length.

Harry K. Messenger.

Kennedy, Robert E. **Cystic malignant melanomas of the uveal tract.** Am. J. Ophth. **31**:159-167, Feb., 1948. (13 figures, 2 tables, 6 references.)

Moulton, E. C., and Moulton E. C., Jr. **Leiomyoma of the iris.** Am. J. Ophth. **31**: 214-217, Feb., 1948. (2 figures, 8 references.)

Taliercio, A. **A case of iridocyclitis and optic neuritis from a focus of infection in the appendix.** Ann. di ottal. e clin. ocul. **72**:663-670, Nov., 1946.

A 26-year-old agricultural worker had suffered for a year with severe and painful iridocyclitis that had resisted all treatment. Because of attacks of right-sided abdominal pain a diagnosis of chronic appendicitis was made, and an appendectomy was performed. Ten days later the eye was strikingly improved. Pain and tenderness had disappeared, the circumcorneal injection was much less, and a great part of the exudate in the anterior chamber had been absorbed. Previously the entire lower half of the cornea had been covered with thick lardaceous exudates. The fundus could now be seen for the first time, and it was noted that the optic disc was hyperemic and had blurred margins. Three weeks later the iridocyclitis was inactive, and the hyperemia of the disc had given way to pallor.

There can be no doubt of a causal relation between the appendicitis and the

ocular inflammation. The question of focal infection in general is reviewed, with particular reference to the work of Rosenow and his followers. It seems probable to Taliercio that the disease of the eye is due not to the presence of bacteria in the ocular tissues but to bacterial toxins with an elective tropism for ocular tissues. Harry K. Messenger.

Unger, Kuno. **Neurofibromatosis iridis. (Recklinghausen's disease).** Arch. Ophth. **38**:654-659, Nov., 1947.

Two cases of neurofibromatosis involving the iris are reported with a short discussion of the disease in general.

R. W. Danielson.

Yen, Chen. **Concerning choroiditis proliferans.** Am. J. Ophth. **31**:207-208, Feb., 1948. (2 figures.)

9

GLAUCOMA AND OCULAR TENSION

Comberg, W. **Mydriatics in the treatment of glaucoma.** Klin. Monatsbl. f. Augenh. **112**:134-135, 1947.

Atropine and scopolamine may relieve the pain in blind or nearly blind eyes with absolute glaucoma. One can disregard the effect of the medication on the intraocular pressure. The relief from pain is due to a relaxation of the iris and a complete immobilization of the sphincter.

Max Hirschfelder.

Denig, R. **The restitution of the outflow from the anterior chamber by iridotorsion in primary glaucoma.** Klin. Monatsbl. f. Augenh. **112**:97-99, 1947.

The author discusses certain aspects of his iridotorsion. The proper incision and a special spatula knife are described. It is stated that the opening in the sclera (1 mm. high and 3 mm. long) prevents the plugging of the filtering hole with iris tissue. The danger of prolapse of vitreous and ciliary body is less than in the sclerectomy of LaGrange. Denig also prefers iridotorsion in acute glaucoma.

Max Hirschfelder.

Denig, R. **Needle diathermy and its significance for sympathetic ophthalmia.** Klin Monatsbl. f. Augenh. **112**:99-103, 1947.

The article reviews the history of diathermy puncture of the ciliary body from the early operation with Paquelin cautery of Fiore to the recent diathermy cautery of Strebel and Vogt. Animal experiments to investigate the mode of action of needle diathermy have never resulted in a permanent lowering of the intraocular pressure, chiefly owing to the fact that the vasomotor psychoreflex is primitive in animals. This lack of a strong psychoreflex with accompanying strong sympathetic reactions also explains the absence of primary glaucoma and sympathetic ophthalmia in animals. Needle diathermy destroys the vasomotor capillary nerves and in human beings extinguishes the sensory vasomotor reflex and psychoreflex. This results in a lowering of the intraocular pressure and, in secondary glaucoma, benefits the cyclitic inflammation. These considerations favor Vogt's diathermy puncture. According to the author's theory an undamaged uveal prolapse merely produces a glaucoma because of constant stimulation of the sensory vasomotor reflex which may possibly be increased through an exaggerated psychoreflex. In contrast, constant stimulation of a damaged and torn uveal prolapse leads by means of the vasomotor psychoreflex through direct reaction to a chemotactic inflammation which may involve the second eye in a sympathetic ophthalmia through an indirect reaction. The application of several diathermy punctures in both eyes should be helpful in sympathetic ophthalmia and should act by a depression of vasomotor reflexes and sympathetic reactions. Diathermy punc-

ture is not the surgery of choice for ordinary glaucoma. There are too many unknown factors such as the number of the destroyed capillaries, the variable behavior of the vasomotor psychoreflex, the impossibility of its destruction through the punctures. The procedure is indicated only in absolute malignant hemorrhagic glaucoma and in aphacic glaucoma.

Max Hirschfelder.

Gerard, R. **Contribution to the study of incomplete glaucoma.** Arch. d'opht. 7: 511-520, 1947.

Gerard states that the classical conception that increased intraocular pressure is primary in glaucoma, and that all symptoms are derived from this hypertension, must be abandoned. He refers to the new conception, introduced by R. Weekers, of incomplete glaucoma in which glaucoma without hypertension is one of the most typical forms. He reports five examples of this form and states that the pupillary alterations, field defects, and excavations of the disc are characteristic and differ essentially from the symptoms of optic atrophy. He states that the nerve changes noted in glaucoma without hypertension are not due to compression of the nerve by sclerosed intracranial vessels. Gerard concludes that chronic simple glaucoma results from alterations in the intraocular blood vessels. The article is documented by numerous visual field studies.

Phillips Thygeson.

Günther, G. **The intraocular pressure in absolute primary glaucoma.** Klin. Monatsbl. f. Augenh. 112:124-133, 1947.

The behavior of the intraocular pressure in 60 cases of primary absolute glaucoma was investigated. The tension curve showed the normal variation of higher night values in 56 percent of the untreated cases. In 36 percent the curves did not follow any regular pattern, and 8 percent had a continually high tension. The other eye of the same patient followed the normal pattern in 66 percent of the cases. The amplitude between highest and lowest tension was 10 mm. or less in one third, 20 mm. in another third with over 20 mm. in one fourth of the cases. These values were established during a twenty-four hour period. Medication with miotics leads to greater variations in the daily curve. Parallelism of the tension curve in the two eyes occurred in one half of the cases, but was sometimes lost after surgery. Cases of absolute glaucoma with pressures of less than 40 mm. responded well to miotics, whereas a return to normal values was rare whenever the initial tension ranged between 50 and 100 mm. Only one quarter of the patients with an eye blind from primary glaucoma had had adequate and correct treatment. Proper treatment could, in the author's opinion, have prevented blindness in at least 25 out of the 60 eyes and would have had a possible chance of success in 21 others. Early diagnosis and treatment are of paramount importance.

Max Hirschfelder.

Mügge, F. **Trephine-cyclodialysis as operation for primary glaucoma.** Klin. Monatsbl. f. Augenh. 112:104-113, 1947.

Trephine-cyclodialysis was first described in 1934 by Sallman and is, in the experience of the author, more efficient than the usual antiglaucoma operations. The operation opens the way for drainage of aqueous into the subconjunctival space. The trephine opening is made 7 to 8 mm. from the limbus in the lower outer sclera. With the patient in sitting position during the postoperative period any possible hemorrhage will drain readily through the trephine opening. A 1.5 or 2.5-mm. trephine is used. The cyclodialysis involves one-third of the total iris root. The article reports successful results in 82 percent of 28 cases, compared to only 50 percent with the Elliot trephine which

was, however, done, in more unfavorable cases. Permanent results and no postoperative infections are claimed. The theory of cyclodiathermy puncture is discussed. Mügge believes that it has an irritative influence on the secretory function of the ciliary body and that it increases the flow of aqueous. He believes that the procedure should be reserved for painful secondary glaucoma.

Max Hirschfelder.

Radnót, M. **The effect of testosteron preparations on the intraocular pressure.** Ophthalmologica **114**:168-171, Sept., 1947.

Injections of a testosteron preparation named Androfort raised the ocular tension in three patients with chronic simple glaucoma.

Peter C. Kronfeld.

Toledo, Renato de. **Propedeutics of glaucoma.** Arq. brasil. de oftal. **9**:101-120, 1946.

The author devotes twenty pages to a general review of the subject under various headings, including day and night variations in tension, provocative tests, gonioscopy, and clinical records. He includes a printed form of record to be used in the accumulation of clinical data.

W. H. Crisp.

10

CRYSTALLINE LENS

Alger, L. J. **Use of absorbable corneoscleral sutures in cataract surgery.** Arch. Ophth. **38**:665-667, Nov., 1947.

Alger reports favorable on the use of 0000 plain surgical gut for corneoscleral sutures in cataract surgery.

R. W. Danielson.

Duverger, C., and Brégeat, P. **Some details on the intracapsular extraction of cataract.** Arch. d'opht. **7**:379-389, 1947.

The authors describe their technique for intracapsular extraction. They dilate the pupil with adrenalin, administered subconjunctivally, just before operation. They use cocaine for topical anesthesia and procaine for Van Lint akinesia and retrobulbar injection. A superior rectus suture and Pley speculum are then employed. Incision with conjunctival flap is made with keratome and enlarged with scissors to the extent of one-half the circumference of the globe. A single peripheral or ordinary iridectomy is made after a single security suture has been placed at 12 o'clock.

For extraction they use the Green forceps, grasping the lens near the equator and making counter pressure with the Arruga or Daviel spoon. The rupture of the first zonular fibers below is made by lateral movements with the forceps. If the capsule should tear, traction is continued and the operation completed as an extracapsular extraction. If the complication of vitreous loss occurs, the peripheral iridectomy is always converted into a complete iridectomy except when the vitreous is entirely fluid. After the single security suture has been tied, the iris is replaced and additional sutures are then placed on each side and tied in half knots. Eserine and penicillin or a sulfonamide solution are then instilled and a monocular dressing applied. On the following day, daily instillations of 1-percent atropine sulphate solution are begun. The patients become ambulatory on the sixth or seventh day.

The authors stress particularly the advantages of keratome incision and enlargement of the wound with scissors.

Phillips Thygeson.

Hughes, W. F. and Owens, W. C. **Postoperative complications of cataract extraction.** Arch. Ophth. **38**:577-595, Nov., 1947.

This paper is a very instructive report of a study that has been made of the causes, treatment and prognosis of complications following cataract extraction in

2,086 cases at the Wilmer Ophthalmological Institute. R. W. Danielson.

Kirby, D. B. **Intracapsular surgery of dislocated and subluxated lenses. Suture methods. Results of intracapsular surgery.** Rev. brasil. de oftal. 6:61-72, Dec., 1947.

This is a translation into Portuguese of the author's summary of an address regarding his special technique for dealing with resistant zonules. A summary of results in one hundred cases is included. W. H. Crisp.

11

RETINA AND VITREOUS

Appelmans, M. **Angiomatosis of the retina in the child.** Arch. d'opht. 7:489-510, 1947.

The author reviews the history of von Hippel's disease and refers to Charles Deval's description of it in his textbook published in 1862 and entitled, "Traite theorique et pratique des maladies des yeux." This was before the development of the ophthalmoscope and it was not until 1882 that E. Fuchs described the ophthalmoscopic appearance of the disease. Appelmans reports a case in a boy of four years. The right eye developed strasbismus at the age of two, and at four years of age the father noted a metallic reflex in the pupil. Ophthalmoscopic examination revealed a lobulated grayish vascular tumor of the retina with numerous white and yellow spots scattered over the surface. The left eye was normal. The tumor increased in size steadily over an observation period of two years. The blind eye was enucleated and microscopic study showed a complete detachment of the retina with a capillary angioma infiltrating the inner layers. Foci of glial proliferation were disseminated widely.

Appelmans discusses in detail the differential diagnosis, both clinical and microscopic, of this tumor from retinoblastoma, pseudoglioma, and Coats's disease. He notes that angiomatosis becomes bilateral in more than half of the cases and that the menace of cerebellar, medullary, and visceral lesions may continue until as late as the forty-fifth year. He notes the congenital and hereditary nature of the disease. Phillips Thygeson.

Ayres, Francisco. **Classification of the ophthalmoscopic pictures of arterial hypertension.** Arq. brasil. de oftal. 9:120-125, 1946.

This is a brief summary of the various "signs" of hypertension in the ocular background. W. H. Crisp.

Baillart, P. **Retinal hypotension.** Ann. di ottal. e clin. ocul. 72:705-710, Dec., 1946.

A diagnosis of retinal hypotension is made when application of the ophthalmodynamometer to the eye with a weight of less than 25 grams produces pulsation in the retinal arteries. In retinal hypotension, if the difference between the diastolic and systolic pressures is small, the blood stream does not have sufficient force to overcome the capillary resistance, and the hydrostatic pressure is insufficient to permit the normal metabolic exchanges between the blood and the tissues. The ocular symptoms, which are on the basis of local syncope, include the sensation of black spots before the eyes, transitory episodes of blindness, and accommodative and retinal asthenopia, which makes prolonged use of the eyes very trying. Failure of the capillary circulation may lead to loss of conductivity or even eventual atrophy of the nerve fibers. Gunn's dots in the macula are often associated with retinal hypotension, and closure of the central retinal vein may be due to a local hypotension or at least to a circulatory deficit. Sometimes the effects of retinal hypotension are mistaken for those of angiospasm, which likewise produces retinal anemia, but the con-

dition is only aggravated by the use of vasodilators, which are contraindicated in retinal hypotension.

Therapy is ineffectual but recognition of retinal hypotension clarifies certain functional disturbances and warns of possible threats to vision.

Harry K. Messenger.

Busacca, A. **The appearance of the normal fundus studied by the stereo-ophthalmoscope.** Arch. d'opht. 7:361-378, 1947.

Busacca employed the contact and glass and slit-lamp of Goldmann to study the fundus of the normal eye. He states that the technique is simple and that the examination can be made a routine clinical procedure. With pupils fully dilated it is possible to study an area having a radius of six disc diameters from the fovea centralis. Busacca used a magnification of 9.5 diameters.

The stereoscopic details of the normal macular region in adults of various ages are described and illustrated with drawings in black and white and in color. The author states that stereo-ophthalmoscopy is the only satisfactory method for a minute study of the details of the fovea centralis which he describes in minute detail. He compares the ophthalmoscopic findings with the histologic details and this adds considerable interest and value to his exposition. He notes that with stereo-ophthalmoscopy it is possible to distinguish in the fundus a series of surfaces and layer which enables one to estimate the depth and character of pathologic lesions. Phillips Thygeson,

Campos, Raffaele. **Detachment of the vitreous and detachment of the retina.** Ann. di ottal. e clin. ocul. 72:679-689, Nov., 1946.

Campus reports his study of detachment of the vitreous in 28 patients with unilateral detachment of the retina. For examination of the vitreous he used a modified slit lamp with an arc light and Lindner's angulated microscope. In place of a contact lens (with its obvious disadvantages) for eliminating the refractive power of the cornea he adopted Hruby's suggestion of using a plano-concave lens of 55D, worn by the patient in a trial frame. Such a lens has a useful surface of 20 mm., and for examining the vitreous in detail at various depths weaker minus lenses can be substituted for it.

In five patients, between 20 and 47 years of age, either emmetropic or with myopia not exceeding 1.25D, he found no detachment of the vitreous either in the sound eye or in the eye affected with detachment of the retina.

In another group of 5 patients, 55 to 65 years of age either emmetropic or with myopia not exceeding 6.00D he found a slight detachment of the vitreous in all the affected eyes and a very marked detachment of the vitreous in the sound eye of three of these patients.

In 18 patients, 19 to 57 years of age, with high myopia (7.50-22.00D) he found a slight detachment of the vitreous in nearly all the eyes affected with detachment of the retina, whereas there was a complete posterior detachment of the vitreous in the sound eyes in almost every case. Campos calls it a "curtain-like" detachment because the posterior portion of the hyaloid membrane is hung like a curtain at some distance in front of the retina.

From these assembled data it is inferred that in detachment of the vitreous the fundamental factors are age and high myopia rather than detachment of the retina. There is no parallelism in the degree of detachment of the one and of the other; in fact, it can be said that highly myopic eyes with a "complete" detachment of the vitreous are less likely to suffer detachment of the retina than those eyes with only a slight detachment of the vitreous or none at all. Hence the presence of a "complete" detachment of the

vitreous in a highly myopic eye is of good prognostic significance. The fact that detachment of the retina in these cases is usually associated with slight rather than with extensive detachment of the vitreous confirms the theory of Gonin-Lindner regarding the importance of adhesions between vitreous and retina in the genesis of retinal tears: the vitreous by its inertia, when the eye is rotated, exerts traction upon the retina at points of adhesion. When the vitreous is not adherent there is no traction, and hence no tear or detachment of the retina.

After operation for reattaching the retina the detachment of the vitreous was generally greater than before. This is readily understandable, since the replacement of the retina only increases the gap between it and the vitreous. The position of the latter is not affected by the operation. Harry K. Messenger.

Contardo, René. **Central serous retinitis or recurrent macular edema.** Ophth. ibero am. **8**:251-256, 1946.

Macular edema in a woman of 35 years and a man of 48 years is described. Marked improvement followed ingestion and injection of methylic antigen. The corrected vision improved in the first case from 6/10 to 6/6 in one patient and from 5/30 to 5/10 in the other. Each case was believed to have a tuberculous origin. In the asthmatic patient the general condition also improved. (References.)

W. H. Crisp.

Doggart, J. H. **Symptoms of macular degeneration.** Tr. Ophth. Soc. U. Kingdom **65**:180-186, 1945.

The unobtrusive course of many macular lesions leads to difficulty in the interpretation of the clinical history The following symptoms are given that may arise in macular disorders: Failure of central vision which may be slow or rapid, blurred vision, apparent bending of straight lines, incompleteness or discontinuity of objects, capacity to see objects relatively clearly by eccentric vision, positive scotoma, changes in apparent size of objects, uniocular diplopia, and interference with color vision. The history of visual disturbance accompanied or immediately preceded by aching behind the affected eye seems to increase the likelihood that inflammation and not degeneration may be responsible for the damage in question. When a macular abnormality remains limited to one eye for years it is all the more likely to be traumatic or inflammatory in origin.

Beulah Cushman.

Fialho Sylvio, Abreu. **Retinal arteries or arterioles.** Rev. brasil de oftal. **6**:101-106, Dec., 1947.

This article is largely a series of quotations from Wagener's discussion of the subject (Trans. Amer. Ophth. Soc., 1946).

W. H. Crisp.

Gandolfi, Carlo. **The importance of cilioretinal arteries in circulatory lesions of the retina.** Ann. di ottal. e clin. ocul. **72**:610-615, Oct., 1946.

In a case of occlusion of the central retinal artery presented by Gandolfi the central vision was eventually unimpaired, thanks to a large cilioretinal artery, though the visual field was much reduced. In a second case occlusion of a cilioretinal artery, notwithstanding the integrity of the central retinal vessels, resulted in a persistent paracentral scotoma. It was noteworthy that in this second case the central vision was likewise unimpaired.

Harry K. Messenger.

Granström, K. O. **Nomenclature in retinal changes associated with internal diseases, particularly hypertensive diseases and diabetes mellitus.** Acta. Med. Scandinav. suppl. 196, pp. 40-44, 1947.

In order to diminish the confusion in

describing the findings in patients with hypertension the author recommends that the "hypertensive fundus" be divided into the following four stages: 1. The arteries are narrowed and have an irregular lumen. The light reflex is broadened and there is arterio-venous compression. 2. The vascular changes are more marked and there are mild retinal changes. 3. Vessel changes are advanced and are associated with pronounced retinal hemorrhages and white exudates. 4. The classic albuminuric retinitis appears with edematous changes in the retina and swelling of the optic disc.

A similar classification is recommended for the findings in the toxemia of pregnancy.

The "diabetic fundus" is also grouped into four stages. These are characterized by: 1. isolated hemorrhages in the retina, usually round, 2. more severe hemorrhages with white spots in the retina, 3. many deep hemorrhages and many more white spots, and 4. severe hemorrhages into the vitreous with a proliferating retinitis. H. C. Weinberg.

Longhena, Luisa. **Concerning the etiology of the retinal detachment.** Boll.d' ocul. **26**:227-253, April, 1947.

Exact biomicroscopic examination of 43 patients suffering from retinal detachment convinced the author that a chronic serous uveitis causes most if not all retinal detachments. This mild and latent inflammation is not a sequel of the retinal lesion; it can be observed before the development of the detachment and also in the other eye with completely normal retina. Longhena found that tuberculosis may be the most frequent cause of this chronic uveal inflammation; in some cases it may also be lues. Contributing factors were hyperglycemia, hyperazothemia, hypertensive heart disease. Eyes showing traces of this uveitis should never be operated on for the retinal detachment; local and general treatment of the uveal disease is indicated instead.

K. W. Ascher.

Morone, Giulio. **Tono-optic reactions of the pupil in tapeto-retinal degeneration.** Arch. di. ottal. **51**:1-28, Jan.-Feb.-Mar., 1947.

The literature concerning the concept that tapeto-retinal degenerations arise from disturbances of the diencephalic hypophyseal system is reviewed. Changes in the tono-optic reaction of the pupil are said to arise from a similar disturbance and have been observed in cases of retinitis pigmentosa.

The author carried out pupillographic studies on patients who had disturbances of this system. He concluded that changes could exist without altering the pupillogram. Positive findings were of value but negative findings were not conclusive. Of the twelve cases of tapeto-retinal degenerations only one of retinitis pigmentosa had positive findings. The author believes that no definite connection can be demonstrated between disturbances of the diencephalo-hypophyseal system and retinal degeneration. If they do exist together it is probably because of their close association embryologically.

Francis P. Guida.

Rados, Andrew. **Macular hole with extensive peripheral detachment of retina.** Arch. Ophth. **38**:596-604, Nov., 1947.

After a discussion of the literature and a clinical description of macular hole, the author reports a case complicated by a retinal detachment. There follows a discussion of the difference between macular holes and peripheral holes and the reasons why the latter are so much more apt to cause retinal detachment; the insertions of the extraocular muscles seem to be the most potent factor. R. W. Danielson.

Veirs, Everett R. **Periphlebitis associated with intracranial manifestations.** Am. J. Ophth. **31**:168-170, Feb., 1948.

12

OPTIC NERVE AND CHIASM

Magnus, J. A. **A case of pseudo-glaucoma.** Brit. J. Ophth. **31**:692-696, Nov., 1947.

A 74-year-old man presented himself for a change of reading glasses. Both fundi showed deeply cupped and somewhat pale discs. The tension was normal and repeated provocative tests failed to change this tension. In the right eye the field had a marked nasal step that reached the fixation point and a typical arcuate nerve fiber bundle scotoma. In the left eye the field showed a general peripheral depression. X-ray studies of the sella showed calcification of the internal carotid arteries.

It is possible that the pressure atrophy of the nerves caused a softening and degeneration of the fibers which resulted in a recession of the lamina and the cupping. The author believes that this was a pseudo-glaucoma due entirely to the pressure of the calcified arteries.

Morris Kaplan.

Wagner, F. **Clinical and histological findings in the optic nerve in acute wood alcohol poisoning.** Klin. Monatsbl. f. Augenh. **112**:167-171, 1947.

Sudden amaurosis and papilledema occurred in a patient with methyl alcohol poisoning. After death edema of the brain was found. The eyes showed an extensive non-inflammatory edema of the optic nerve but no degeneration. The author believes that the edema is the cause of the sudden decrease in sight and that degeneration of the optic nerve and ganglion cells in the retina is a later result of the poison. He recommends lumbar puncture for early treatment. (Bibliography.)

Max Hirschfelder.

13

NEURO-OPHTHALMOLOGY

Morano, Massimo. **Late lid syphilis; considerations concerning four gummous manifestations.** Boll. d'ocul. **26**:449-464, July, 1947.

Difficulties may arise in diagnosis and proper treatment of productive ulcerous lid lesions located in the tarsus and in the pretarsal subcutis. The pre- and post-therapeutic appearance of three eyes is shown in photographs. (Bibliography.)

K. W. Ascher.

Recupero, Enzo. **Adie's syndrome.** Ann. di ottal. e clin. ocul. **72**:616-627, Oct., 1946.

This article is a review of the literature on Adie's syndrome and is accompanied by an extensive bibliography. No new data seem to be brought forward. Because of lack of demonstrable anatomic and pathologic changes in the nervous system Recupero is dissatisfied with all the various pathogenetic hypotheses. As to etiology, he concludes that syphilis can be invoked as a probable cause in a large number of cases, and that in certain other cases a hereditary factor is important. He finds little to say regarding therapy, but the question arises whether some of the B vitamins (riboflavin in particular) may be of value.

Harry K. Messenger.

14

EYEBALL, ORBIT, SINUSES

Campos, R. **Concerning a special form of variable exophthalmos: exophthalmos with intermittent aggravation.** Arch. d'opht. **7**:390-401, 1947.

Campos reports the case of a 15-year-old girl with an exophthalmos of two years duration and diminished vision in the affected eye. The exophthalmos had

progressed rapidly in the two months before the first examination. At that time the exophthalmometer reading was 22 mm. as compared to 17 mm. in the normal eye. However, when the patient's head was lowered the exophthalmos increased to 24 mm. It was reducible by pressure, non-pulsating, and auscultation revealed no bruit. There was no palpable tumor and movements were normal except for slight limitation of abduction. The Graefe, Moebius, Stellwag, and Geoffroy signs were negative. Vision was 10/10 in the normal eye and 2/10 in the other. Fundoscopic examination revealed a circumpapillary retinal edema. X-ray examination of the orbit showed two small round opaque bodies in the upper outer quadrant. At operation a number of large dilated varicose veins were seen and removed. After the operation vision improved to 5/10 and the exophthalmos was reduced to one millimeter of protrusion but there was slight ptosis and limitation of abduction and adduction. The radiopaque bodies were believed to be phleboliths.

The author considers the sign of increased exophthalmos after inclination of the head to be pathognomonic of varices of the orbit. He discusses in detail the different forms of variable exophthalmos and offers a classification.

Phillips Thygeson.

Lyons, F. M. **Contracted socket. The splint method of postoperative control.** Brit. J. Ophth. **31**:703-709, Nov., 1947.

In the contracted socket the conjunctiva that remains should not be removed as in the operations based on the Wheeler procedure. This conjunctiva should be meticulously left or placed over the tarsal plates as far back as the fornix, if possible; this materially cuts down the incidence of entropion and affords a much more natural resilience and adaptability of the new socket.

In addition to this preservation of the conjunctiva a new method of keeping the acrylic mold in place after operation is most necessary to prevent return to the contracted state. The author has made a group of acrylic molds patterned after standard prostheses of varying size and into which is incorporated a steel nut which receives a short steel rod.

General anesthesia is used and a wide canthotomy performed. All adhesions are released and the conjunctiva preserved along the tarsal plates. The caruncle is preserved if possible. The largest mold over which the lids will close is selected and fitted with its steel rod. The socket is insufflated with penicillin and sulphathiazole powder. A thin epidermal graft is taken and made to cover the mold evenly. It is then placed in the socket, the rod removed and the previously placed canthotomy sutures tied. The lids are not sutured together. A pressure dressing is applied and left in place for six days. Then the sound eye is uncovered. A plaster of paris headdress is put on into which is incorporated a metal plate and clasp which will hold the rod to be replaced into the mold on the seventh day. On the seventh day the mold is eased out of the socket which is then irrigated with warm saline solution. The patient is allowed to be up and about and the mold is removed twice weekly until tendency to contracture is past. At that time, a final prosthesis is fitted. The molds and the splint arrangement can be used repeatedly. (3 illustrations.) Morris Kaplan.

Miller, G. L., Schlossman, A., and Boyd, W. H. **Spontaneous luxation of the eyeball.** Arch. Ophth. **38**:677-680, Nov., 1947.

The authors report a case of spontaneous luxation of the eyeball in a 42-year-old obese negress and give a short review of the literature. R. W. Danielson.

Van Wien, Stefan. **Lymphocytoma of the orbit successfully treated by Roentgen irradiation. Report of a case.** Am. J. Ophth. 31:209-212, Feb., 1948. (2 figures, 5 references.)

15

EYELIDS, LACRIMAL APPARATUS

Bakker, A. **Xanthelasmata and autonomic nervous system. A new syndrome.** Brit. J. Ophth. 31:686-689, Nov., 1947.

Xanthelasmata are entirely harmless tumors usually found near the eye-lids. Bakker has found that they are much more common than is generally assumed and are often associated with various types of allergic disease. He studies four generations of a family in which both diseases were present to an uncommonly large degree. He feels satisfied that there is a relation between the two and feels that both are due to a labile autonomic nervous system. This dysfunction of the vegetative nervous system might be due to an imbalance of the cholesterol metabolism since many investigators have found an increased amount of cholesterol in the blood of patients with xanthelasma.

Morris Kaplan.

Corrado, M. **Erythematous dermatitis of the lids from penicillin.** Ann. di ottal. e clin. ocul. 72:455-466, Aug., 1946.

A case of allergic erythematous dermatitis of the lids that followed the therapeutic use of penicillin ointment (1000 units per gram) in the conjunctival sac is described. The diagnosis of allergy was confirmed by skin tests, and the patient was found to have an allergic diathesis (delayed sedimentation rate, exaggerated reflexes, and dermographia). It was subsequently found by experimentation on the same patient that intravenous injection of vitamin C for three days delayed the appearance of the allergic phenomena and lessened their severity.

The differential diagnosis of three types of hypersensitivity is discussed. Intolerance is a toxic reaction, like the reaction to a toxic dose of the offending substance in a normal individual. Idiosyncrasy is a primitive reaction that is not secondary to sensitization. Allergy is secondary to sensitization

Harry K. Messenger.

Foster, J. **Plastic repair of the lids.** Tr. Ophth. Soc. U. Kingdom. 65:113-135, 1945.

In plastic surgery the author highly recommends the use of hooks for retraction, patterns of Mackintosh, cigarette-tinfoil or cellophane, the plastic pen for outlining donor areas and the Gillies needle holder for intradermal suturing. He also advises the use of kationic soap antiseptic which neither alters the appearance of the skin nor kills grafts and the tissue glue (the patient's own plasma painted on the recipient area and an extract of his macerated white cells on the graft which produces adhesion of a skin graft in a few minutes and partial vascularization in 48 hours without a compressive dressing). Slight injuries may demand no more than simple suture. Fibrous tissue must be excised from the lids before skin is grafted in the treatment of ectropion. The use of hook traction aids in the excision of palpable fibrous bands.

Damage to the conjunctiva must be treated as skin injury with the excision of fibrous tissue and the supply of an epithelial covering. The author has found the use of oral mucous membrane preferable in the repair of a contracted socket. Damage to all three layers of the lid can frequently be repaired by the use of the sutures in layers. The repair of the canaliculus is most important if there has been a loss of tissue at the inner canthus. (27 figures.) Beulah Cushman.

Grignolo, Antonio. **Possibilities and limits of penicillin therapy of blepharitis.** Boll. d'ocul. **26**:117-127, Feb., 1947.

Eleven cases of squamous blepharitis and 39 cases of ulcerative blepharitis were observed for a period of two and seven months under penicillin treatment, and after discontinuation of the applications. An ointment containing 500 to 1,000 units per gram was used. In squamous blepharitis the results were negligible, and in ulcerous blepharitis possibly more rapid and more durable cures were achieved. Only one out of 39 ulcerous lesions did not respond. In one-half of the cured cases there was recurrence which responded well to repeated therapy. Cultures were taken from the lid borders and the germs obtained were tested for their penicillin resistance; there was no obvious parallelism between in-vitro response and therapeutic effect. The author attributes more importance to the "constitutional terrain" and stresses the importance of general treatment in conjunction with local applications. Among four tables, the second deserves especial attention for its meticulous and elucidating exposition of all pertinent data on 39 patients: their age, diagnosis, duration of disease, strength of ointment and frequency of application, systemic additional treatment, results, period of observation, recurrences, final result, microorganisms, isolated and inhibitory effect of penicillin in vitro. K. W. Ascher.

Macomber, W. B., and Berkeley, W. T. **Use of Neck Tubed Pedicles in Reconstruction of Defects of the Face.** Plast. and Reconstruct. Surg. **2**:585, Nov., 1947.

Tubed pedicle skin from the neck is advocated for facial reconstruction because of greater similarity of skin color and texture, greater vascularity, ideal thickness, proximity of tissue, and production of minimal defect in donor area.

The tension on the tube and surrounding tissue must not exceed normal skin tension, and the tube should be constructed of sufficient length so that the defect can be easily reached by the flap. The width of the average neck tube is 4.5 to 5 cm., and the length varies in every case depending on the distance to the defect as mentioned above. In long neck tubes when the 3-to-1 length-to-width ratio is exceeded a central bridge is required. This serves as a relay to prevent ischemia or poor venous return, and the tube at this point should be greater in diameter than the rest of the tube to prevent constriction and circulatory embarrassment. Tubes can be used to bring skin and subcutaneous tissue, and also to carry additional neck skin to the face in the form of a flap. If these flaps are large, however, they should be transferred only after primary, secondary and sometimes tertiary delays. Surgical incisions in the neck should conform to Langer's lines, which run transversely across the neck. The formation of a tube in a vertical direction on the neck will result in a bowstring type of scar which will necessitate a Z-plasty for correction.

Twenty photographs and two plates of drawings are used to illustrate four case reports. The cases show large facial defects, and in one patient with extensive damage the eyelid is corrected with the end of the tube. Alston Callahan.

Marín Amat, M. **My surgical procedure for entropion of the lower lid.** Arch. Soc. oft. hisp.-amer. **7**:808-814, Aug., 1947.

Marín Amat resents not having his operation included in Arruga's last book on surgery of the eye, and in Castroviejo's course on surgery of the cornea and the lids. He originally reported the technique in 1915. He attaches the lower lid to the orbital aponeurosis, at a point midway between the border of the lid and the inferior orbital border, with three to five sutures. An incision parallel to the border

of the lower lid and 5 mm. from it is made through the skin and the orbicularis. The protruding fibers of the orbicularis are excised; the sutures pass through the lower lip of the skin incision, through the orbital aponeurosis, and through the upper lip of the skin incision. The author has performed the operation in over a thousand cases and considers his procedure simple, rapid in execution, and functionally and cosmetically efficacious. (5 illustrations.) Ray K. Daily.

Radnót, M. **Rare tumors of the caruncle.** Ophthalmologica **113**:270-275, May, 1947.

Some authors consider the caruncle as an island of skin. This view is only partly correct. The caruncle resembles skin in that it contains sebaceous glands and hair follicles but differs from skin in that it harbors accessory lacrimal glands and glands of Moll's type and in that its epithelium shows no keratinization. The more common tumors of the caruncle are papillomas, angiomas, nevi and dermoid cysts. The author reports in detail two unusual neoplasms of the caruncle. One, in a white man, 69 years of age, proved to be a cyst lined by several layers of oncocytes, a specific mucous cell first described by Hamperl (Virchow's Arch. 282:724, 1931). The cyst probably originated from an accessory tear gland. The second case in a white man, 67 years of age, was a local recurrence of a giant cell sarcoma. Peter C. Kronfeld.

Scuderi, G. **Leishmaniasis of the eyelid associated with keratitis.** Rassegna ital. d'ottal. **16**:335-356, Sept.-Oct., 1947.

Instances of the presence of the Leishman protozoon have frequently been reported from Italy. The classification, staining peculiarities and structure of the trypanosome are described, as well as its cultural characteristics.

Two cases are reported in which there was an involvement of the prelacrimal region. In both there was a marked edema of the upper eyelid and the region of the lacrimal sac. Both were observed in the ulcerative stage. Ulceration of the cornea by the Leishman trypanosome is of a deep destructive type, similar to a pneumococcus ulcer, but first resembles a phlyctenule. The pain is severe and usually the whole cornea is involved and perforation occurs after three to four months. In the two cases reported the use of atabrine checked the keratitis promptly. (2 figures.)

Eugene M. Blake.

Seidenari, Roberto. **Study of the motility of the lacrimal sac after rhinostomy.** Boll. d'ocul. **26**:103-116, Feb., 1947.

Raverdino's dacryocystorhinostomy method was used to study the mechanism of the lacrymal sac. A fine rubber ball, introduced into the drainage tube during the operation, was connected with a Marey's drum, the excursions of which were transmitted to a kymograph. Curves obtained showed that, even after the operation of dacryostomy, the lacrimal sac preserved its contractions. Whereas Roser, Schirmer, Hyrtl, von Graefe, Fuchs and others assumed that the lacrimal sac becomes dilated during blinking, which results in aspiration of the tears from the lacrimal puncta, the opposite opinion was supported by Aubaret, Arlt, Rochat, and others. In three of five patients examined, blinking produced a dilatation of the sac; in the other two patients, a contraction or compression of the sac was indicated by the kymograph curve. Differences in the anatomic relations of the orbicularis tendon are the cause for these discrepancies. Four pictures explain the insertion of the tubing into the stump of the sac, one photograph shows the patient seated at the kymograph, and four kymograph curves are reproduced. K. W. Ascher.

Stallard, H. B. **Plastic repair of the lids.** Tr. Ophth. Soc. U. Kingdom. **65**:68-112, 1945.

In dealing with a healed wound the original defect must be reproduced by thorough excision of scar tissue and undermining of the skin edges before the reconstruction is planned. A drawing of the defect with photographs, radiographs and diagrams of the surgical procedure should accompany the patient to the operating room.

A small defect may be repaired by simple suture of the adjacent tissues or by undermining and sliding these together, but there must be no tension in such a procedure. In larger defects free grafts are used and it is desirable to use eyelid skin whenever possible. With extensive skin loss split-skin grafts (thick razor) are taken from the hairless area over the medial aspect of the upper arm or an epidermal graft (thin razor) is used.

Irregular bony surfaces should be covered by a sliding or rotation flap. The pedicle flap from the frontotemporal region is usually necessary for the reconstruction of the eyelids, although it seldom remains cosmetically or functionally very pleasing. A wandering pedicle graft may be taken from the abdominal wall to wrist and then to the eyelid or from the pectoral region to the neck and then to the eyelid.

Few instruments are used in plastic surgery but they must be in perfect condition. The technique of plastic surgery must be precise, purposeful, clean and finished. The handling of tissue must be minimal and hemostasis complete. Illustrations give the use of the different methods of closure and the use of the different types of flaps. (64 figures.)

Beulah Cushman.

Steinreich, O. S., and Callahan, Alston. **Reconstruction of the face and all four eyelids.** Am. J. Surg. **74**:838-843, Dec., 1947.

A case is reported of a man who, from a severe gasoline burn, developed severe ectropion of all four eyelids, marked facial deformity with ectropion of the right side of the mouth, and granulating third-degree burns of the left parietal region of the scalp. Emergency skin grafting at an overseas hospital was successful in protecting the cornea from drying, and the vision remained 20/20 in each eye. The emergency procedures had not been performed with the purpose of ultimately correcting the deformities.

Six months after the injury, all four eyelids were repaired at one stage under ether endotracheal anesthesia. Incisions were made in the skin of the lids about 5 cm. from and concentric with the lid margins. All cicatricial tissue was removed from the lids and the margins of each pair of lids were united with a subtotal lid adhesion. Crescentic patterns of the required skin were made of transparent celluloid sheets, and an area of split-thickness skin of adequate size for these patterns was removed from the left chest with the Padgett dermatome. Pressure was applied by tying the alternate sutures of the juncture of the graft with the recipient skin over "torpedoes" of cotton wrapped with gauze, saturated in sulfathiazole and cod liver oil. Minor lid repairs were necessary. The tarsorrhaphy uniting the left lids was divided after four months, that uniting the right lids after nine months.

The scalp was repaired with 32 square inches of skin removed from the left side of the back with the Padgett dermatome. The face and lip ectropion was reconstructed with full-thickness skin transferred from the upper arm by means of a bicipital tube graft from each arm. In turn each tube was detached distally from the arm, and attached to the face; later detached entirely from the arm, and the skin

unrolled and migrated to correct the facial defects.

The final results seemed satisfactory.

Four photographs in full color and three in black and white illustrate the article. Alston Callahan.

Stern, H. J. **Autohaemo-therapy in hordeolosis.** Brit. J. Ophth. **31**:766-769, Dec., 1947.

The author recommends the use of intramuscular injection of the patient's own blood in hordeolosis and has found it an effective, inexpensive form of therapy. He believes that abandonment of this treatment has followed indiscriminate use in a multitude of conditions with disappointing results. The treatment may cause a desensitization through stimulation of the reticulo-endothelial system and the formation of specific antibodies. Its use in hordeolosis by the author has been followed by lasting effects and few recurrences. O. H. Ellis.

16

TUMORS

Alagna, Gaspare. **Tumors of the reticulo-endothelial system of the eye. A reticulo-endothelioma of the conjunctiva in a patient with Kaposi's disease. A histopathogenetic contribution.** Ann. di ottal. e clin. ocul. **72**:641-662, Nov., 1946.

A case of Kaposi's disease (multiple angiomatous wine-red spots and nodules of the skin on various parts of the body) in a 61-year-old man is described. About six years after the onset of the skin affection a tumor arose in the submucous layer of the conjunctiva, which on histologic examination proved to be a reticulo-endothelioma (or reticulo-histiocytoma) of angioblastic tendency.

The principal pathogenetic theories of Kaposi's disease are reviewed. The occurrence of this conjunctival tumor, which is probably not a metastasis but a local new growth arising from pre-existing reticulo-endothelial elements in the conjunctiva, confirms the theory that the disease is a generalized reticulo-endotheliosis, sometimes with special characteristics, and may be occasioned by an inherent anatomic and functional inferiority of the reticulo-endothelial system. Harry K. Messenger.

Borges Dias, Artur. **Malignant melanoma in the eyeball.** Arqu. brasil. de oftal. **10**:92-95, 1946.

The single clinical record is of a case of malignant melanoma in a white male child aged 2½ years. There was appreciable softening of the bony floor of the orbit, especially on the temporal side.

W. H. Crisp.

Clifton, F., and Gordon, W. H. **A case of an adenoma arising in a sweat gland of the upper eyelid.** Brit. J. Ophth. **31**:697-700, Nov., 1947.

A 70-year-old woman noted a mass in the upper eyelid that had grown slowly for five years. It had begun as a small crust on the edge of the lid. It was painless, firm, freely-movable, and could be transilluminated freely. It was easily removed in a tight capsule and the wound healed with good cosmetic result. The pathologic diagnosis was adenoma arising from a sweat gland. (3 illustrations.)

Morris Kaplan.

Cory, J. W. E. **Glaucoma secondary to fibrocystic disease of the bone.** Brit. J. Ophth. **31**:731-737, Dec., 1947.

In a 58-year-old man the globe was displaced outwards and forwards by pressure of the tumor from within the orbit which obstructed venous drainage and thereby produced secondary glaucoma. X-ray films showed the condition to be fibrocystic disease of the bone; however, the full Hans Schüller-Christian syn-

drome was not present. It was not possible to determine whether the optic atrophy was due to the glaucoma or to secondary pressure on the optic nerve by the tumor. (5 figures.) O. H. Ellis.

Fairclough, W. A. **Direct inheritance in retinoblastoma.** Supp. New Zealand M. J. pp. 35-36, 1947.

A 50-year-old father who died of primary carcinoma of the liver, had both eyes enucleated at the age of two years. Three of his four children had retinoblastoma. Irwin E. Gaynon.

Gordüren, Süreyya. **Carcinoma of the eye.** Göz kliniği **5**:105-112, 1947.

The author found 18 carcinomas in the region of the eye in 51,000 patients during the last five years. There were 11 carcinomas of the lids and most of these were at the external canthus, which he attributes to the application of irritants to this region by the villagers. There were seven epitheliomas of the conjunctiva and cornea. He saw no carcinomas of the lacrimal sac, orbit, or uvea.

F. H. Haessler.

Halpert, B., and Patzer, R. **Maxillary tumor of retinal anlage.** Surgery **22**:837-841, Nov., 1947.

The authors report a benign neoplasm removed from the maxilla of a six-months-old infant, composed of tissue elements of the retina. They believe that this is the first growth of this nature ever recorded. The external carotid artery was ligated just before removal. Six days later the fundus of each eye was normal.

Bennett W. Muir.

Pascheff, C. **Studies on melanotic tumors of the eye.** Annuaire of the University of Sofia. **26**:147-177, 1946-47.

With clinical and histologic reports Pascheff illustrates the various ocular neoplasms which originate from pigmented cells, and points out the part played by the melanotic cells in the morphology of the various melanotic tumors. The melanocytes comprise the melanoblasts of the retina, the melanophores of the uvea, the pigmented nevus cells, and the melanoblasts of the basal epithelial cells of the conjunctiva. Among the latter are included the melanocytes with granular dendritic processes, which Pascheff discovered in the basal epithelial cells of the limbal conjunctiva in spring catarrh, and which are identical with the cells of Langerhans' found in the epidermis.

All cells containing melanin may form hyperplasias or neoplasms. Melanohyperplasias are benign, and melanoblastomas are malignant. The melanohyperplasias are classified as follows: 1. Melanosis, congenital or acquired, which is manifested in strong pigmentation. 2. Melanoma, which may be epitheliomelanoma, melanophoroma, and epitheliomelanophoroma. 3. Pigmented nevus. The melanoblastomas are divided into melanoepithelioblastoma, melanophoroblastoma and melanonevoblastoma.

Melanoblasts form floccules in the iris and retina. Melanophores grow into melanophoromas in the uvea, and especially the iris, sometimes erroneously called nevus of the iris. Pigmented nevus cells form pigmented nevi which are seen on the corneal limbus and on the skin. Mixed hyperplasia, consisting of melanophores and melanoblasts are described in a report of a melanopapillofibroma of the conjunctiva. The same type of cells are the source of malignant tumors. Melanoblasts of the conjunctival epithelium form melanoepitheliomas of the conjunctiva. Melanoblasts of the retinal pigment epithelium form a melanoepithelioma of the retina, which was first reported by the author at the ophthalmological congress in Amsterdam. An interesting case of a cylindropapilloblastoma of the parsiliaris of the retina is reported for the first time in this article. Melanophores are responsible

for melanofibrosarcomas of the uvea, especially of the choroid, the conjunctiva, and the orbit. On the conjunctiva they are usually pedunculated. Melanofibrosarcoma or melanophoroblastoma of the orbit was described first by the author in 1929. Melanonevoblastomas of the conjunctiva, originating in the pigmented nevus cells are as malignant as melanoepitheliomas, from which they are differentiated by their typical nests. All blastomas are unilateral and malignant, and should be promptly and radically excised before glandular involvement takes place. Ray K. Daily.

17

INJURIES

Cortés, Hernán. **Traumatic aphakia and aniridia caused by contusion of the globe.** Arch. Soc. oft. hisp.-amer. 7:779-786, Aug., 1947.

Cortés reports a case of traumatic aphakia and aniridia in a man with an old degeneration of the macula in the uninjured eye. Because of the poor vision of the uninjured eye enucleation of the injured eye, which was indicated by the gravity of the injury, would have left the patient totally disabled. Conservative treatment was thus almost forced. Two months after the injury the scleral perforation was healed, the fundus was visible, and there were pale gray floating masses in the inferior portion of the eye. There were small holes in the periphery of the retina but the retina was attached everywhere. There was no sign of iris, and vitreous was floating in the anterior chamber. With the aphacic correction vision was better than two-thirds. The problem of industrial compensation is commented upon. In the discussion of the report Sanchez Mosquera described another unusual experience. One eye of a woman with bilateral senile cataract was injured by the horn of a cow. When the acute symptoms of trauma subsided, it was found that the cataract was dislocated, and her corrected vision was 0.5. Ray K. Daily.

Davids, B. **After-treatment of perforating eye injuries.** Klin. Monatsbl. f. Augenh. 112:136-148, 1947.

This paper is based on the therapeutic procedures used in 168 perforating war injuries of the eye which did not require immediate or very early enucleation. Certain phases occur in the course of a perforating injury. At first the mechanical destruction and possible infection of the wound stand in the foreground. Next to the surgical care and local mydriatics intensive foreign protein and fever treatment as well as chemotherapy with sulfonamides and penicillin are most important at this stage. After a few days the eye has either a panophthalmitis or it enters the stage of a chronic uveitis. A few of the eyes may heal quickly. The chronic uveitis of the majority of patients is the result of toxic reactions brought about by bacteria and by protein from destroyed tissues. Retained foreign bodies may cause an aseptic inflammation or have a chemical or electrolytic effect on the eye. Allergic tissue reactions appear in this phase as a result of the antigenic effect of bacteria and body protein. Foreign protein is strongly contraindicated in this stage. Anti-allergic measures are indicated and the author recommends calcium and pyramidon. Later on small doses of foreign protein may be used for desensitization. Retained non-magnetic foreign bodies like glass and small stones may be well tolerated and may become encapsulated. The prophylaxis against sympathetic ophthalmia includes the decrease of the hyperergic reaction through calcium, nonspecific desensitization through mild doses of foreign protein, chemotherapy, mydriatics in the uninjured eye and cautious removal of foci

of infection. Under the routine outlined 131 bulbi were retained with useful vision in one-third of them. (References.)

Max Hirschfelder.

Ferguson, W. J. W. **The treatment of intra-ocular foreign bodies.** Practitioner. **158**:400-405, May, 1947.

This article summarizes the ophthalmologist's approach to the problem of the intra-ocular foreign body. The author stresses the importance of X-ray examination of all perforating ocular wounds in which there is the slightest suspicion of a possible retained foreign body. Methods for X-ray localization of the foreign body are mentioned.

In general, if the injury has not been of sufficient magnitude to destroy the eye, extraction of the foreign body is indicated. The most favorable cases are those in which the foreign body is magnetic. In these instances the giant magnet is used for extraction of the foreign body. The anterior route is selected if the foreign body is in the lens, iris, or anterior chamber. The posterior route, with incision through the sclera and choroid, is used when the foreign body lies in the vitreous chamber. The author mentions the use of surface diathermy at the sclerotomy site to reduce bleeding and also to reduce the risk of postoperative retinal detachment. When the foreign body is nonmagnetic, an attempt should be made to remove it with forceps if such an approach is feasible. Foreign bodies embedded in the cornea or sclera may be allowed to remain if the removal is difficult and if the foreign body produces no irritation.

The author mentions as complications of foreign body removal the occurrence of septic inflammation, iridocyclitis, and sympathetic uveitis. Of greatest importance in removal of intraocular foreign bodies is the minimizing of surgical trauma.

Benjamin Milder.

Flick, John J. **Ocular lesions following the atomic bombing of Hiroshima and Nagasaki.** Am. J. Ophth. **31**:137-154, Feb., 1948. (5 tables, 6 figures, 13 references.)

Friedman, Benjamin. **Use of air injections into Tenon's capsule for localization of orbital foreign bodies.** Arch. Ophth. **38**:660-664, Nov., 1947.

Friedman discusses the advantage of air injections in cases of multiple foreign bodies. The technique of its use is described and illustrated with four case reports.

R. W. Danielson.

Haik, G. M. **Intraocular foreign bodies.** J.A.M.A. **135**:894-900, Dec. 6, 1947.

It is desirable to have the patient recumbent en route from the injury to the ophthalmologist, and the less is done by the first aid persons the better. Emergency removal is practically never indicated unless the globe is hopelessly and totally lost. Sympathetic ophthalmia allows a 21-day period of grace, and there were but 15 cases reported in the last war. Chemotherapy, antibiotics, and fever therapy (canned milk was used in place of fresh milk often, and worked well) are very desirable.

At the author's military installation they did not hesitate to use pentothal for adequate examination in all bilateral and serious injuries. X-ray localizations are discussed, and it is noted that they are sometimes incorrect, and that no detail for their efficiency should be overlooked. They also used a Carney locator, similar in principle to the Berman, but fashioned out of odds and ends available in a theater of war but useful for magnetic bodies only.

For extraction of magnetic particles, the magnet was used. Non-magnetic ones were left alone, or removed, depending upon the situation. The author stresses the importance of closure of all perforat-

ing wounds of the globe by diathermy. (5 figures, abstract of discussion.)

Bennett W. Muir.

Hoffmann, E. A. **Personal experiences with the least traumatizing removal of introcular iron.** Klin. Monatsbl. f. Augenh. 112:156-167, 1947.

Even the smallest pieces of iron and steel should be removed from the eyeball, unless one deals with an only eye and is certain of a rustless or very slowly rusting alloy. The sideroscope is useful in determining the presence of iron. X-ray localization after the method of Comberg (contactglass with lead markings) is most widely used and is especially useful in the modification of Leydhecker which permits two exposures with the patient supine. In doubtful cases with negative findings this method is supplemented by the skeleton-free X-ray after Vogt or the surgical skeleton-free X-ray after Franceschetti. Occasionally one can visualize a foreign body with the ophthalmoscope, and, in certain rare instances, the proof of intraocular iron is brought about by chemical analysis of the aqueous or its spectralanalysis. The presence of several pieces in the same eye should not be overlooked. The article discusses in detail the best method of removal of magnetic foreign bodies from the various locations. Iron can be tolerated in the scleral tissue, but should be removed from the sclera in double perforation. It is better to remove foreign bodies in the anterior chamber through a fresh incision after a few days of initial chemotherapy rather than immediately through the wound. The methods for removal of iron in the iris, lens and vitreous are discussed. For ciliary and retinal magnetic foreign bodies transcleral removal is strongly recommended and the danger of producing retinal detachment by using the giant magnet and the anterior route is stressed. A triangular scleral flap is described as a useful opening for such transcleral removals, especially if combined with diathermy cautery as a precaution against possible retinal detachment.

Max Hirschfelder.

Man, H. X. **A case of monocular diplopia.** Ann. d'ocul. 180:475-480. Aug., 1947.

Among the frequent structural causes of monocular diplopia are refractive and other changes in the cornea and lens with or without spastic accommodation; also peripheral holes in the iris which under proper conditions may form a second pupil. In the case reported a very small iris hole, traumatic in origin, was observed peripherally at 3 o'clock. With both eyes open, macular images are fused and the patient has binocular single vision. The extra-macular image in the left eye causes a crossed diplopia because both the iris hole and the retinal image are located temporal to the macula. When the eye was directed up and to the right the displacement of the retinal image was increased. The cornea was tatooed to cover the iris hole and eliminate the second image. Chas. A. Bahn.

Orzalesi, Francesco. **Another communication concerning diathermy treatment of wounds of the corpus ciliare.** Boll. d'ocul. 26:81-86, Feb., 1947.

In a preliminary publication (Rassegna Medica Sarda, 1946) the author suggested destruction of the injured part of the ciliary body after traumatic lesions to the latter. It seems that this procedure will reduce the danger of sympathetic ophthalmia and will hasten the healing of ciliary body wounds by sealing against the entrance of possible infection. Orzalesi concedes that the number of patients observed and the time elapsed does not yet justify definite conclusions. (2 figures.) K. W. Ascher.

Rees, T. R. **Perforating wound of orbit; report of a case.** M. Ann. District of Columbia **16**:548-549, Oct., 1947.

A twig penetrated the left upper lid of a three year old boy and entered the orbit and intracranial cavity. It injured the optic, oculomotor, troclear, ophthalmic branch of the trigeminal, and the abducens nerve. The eyeball was completely fixed, anesthetized and blind. The twig rested in the interpeduncular space and was removed with forceps along the path of entrance. The eyeball was destroyed.

Irwin E. Gaynon.

Terol Altet, J. M. **Comments on 1500 cases of industrial injuries.** Arch. Soc. oft. hisp.-amer. **7**:771-778, Aug., 1947.

Foreign bodies of the cornea constituted 75.41 percent of the injuries in this group. Biomicroscopic exploration of eyes suspected of a foreign body is obligatory. Their management requires anesthesia, exploration of the lacrimal passages, and asepsis of the conjunctiva. Foreign bodies should be carefully removed with a minimum of epithelial damage, and their removal should be followed by the introduction of an antiseptic ointment into the conjunctival sac, and bandage of the eye. The eye should be inspected with the slit-lamp on the following day for remains of the foreign body or rust and the patient should not be discharged until the epithelium has completely regenerated. Conjunctival foreign bodies were of no consequence. Corneal ulcers constituted 15 percent of the cases. Some occurred subsequent to the delayed removal of a foreign body. They were treated with an antiseptic ointment, and atropine, when indicated by a ciliary congestion. In four cases, or 0.26 percent extensive ulcerations developed which were controlled by surgical attention to the lacrimal passages, foreign protein injections, and atropine and antiseptic ointments locally. Subconjunctival hemorrhages caused by contusion absorbed spontaneously. Contusion of the globe with hyphema occurred in 0.2 percent of the patients. One patient with a recurrent hyphema and a secondary glaucoma was found to have an old iridocyclitis.

Injuries and burns of the lids presented no therapeutic problems. The excellent results achieved in two severe conjunctival burns with sulphuric acid and ammonia are attributed to the prompt removal of the necrotic conjunctiva and transplantation of buccal mucous membrane. The difficulty of a differential diagnosis between a traumatic and a self-inflicted conjunctivitis is illustrated with a case report. In two cases of ocular perforation the patient made an excellent recovery under treatment with sulfanilamide, foreign protein, and atropine and noviform locally. One eye with an intraocular foreign body ended in phthisis of the globe.

The good results obtained in this large group of injuries are attributed to the education of the workers to the importance of prompt ophthalmologic assistance, to the adequate use of protective measures, to the great efficacy of modern anti-infectious agents and to the progress in modern surgery. The author urges that industrial protective measures be enforced by deprivation of compensation for workers who fail to use them, and by punitive measures for employers who neglect to provide them.

Ray K. Daily.

Wilder, H. C. **Intraocular foreign bodies in soldiers.** Am. J. Ophth. **31**:57-64, Jan., 1948. (35 figures.)

Wright, R. E., and Duncan, H. A. **Experiences with the giant electromagnet in the extraction of intraocular foreign bodies of a metallic nature, in the recent war.** Rev. oto-neuro-oftal. **22**:51-54, May-June, 1947.

A soldier sustained a wound of the left eye, amongst other injuries, in a landmine explosion. A metallic foreign body was found in the retina about three disc diameters below the papilla. Using the giant electromagnet and a posterior sclerotomy the foreign body was not easily removed. Success was achieved only after 75 four-second applications of the magnet at a second operation. As a result of experience with this case the authors feel that ordinarily the posterior route should be used when the foreign body is in the posterior segment and the incision should be as close to the foreign body as possible without injuring important structures. A fine pointed terminal should be used, the surgeon must persevere, the patient cooperate, and the magnet be first-rate. A knowledge of the physical and chemical characteristics of the foreign body is essential. In war-time rudimentary localizing procedures must be used to the utmost. Repeated applications of the magnet increases the susceptibility of the foreign body to extraction. Superficial diathermy coagulation of the sclera in the vicinity of a foreign body can produce an uncontrollable reaction. A portable electromagnet should be installed in stations in the theatre of operations. Edward Saskin.

18

SYSTEMIC DISEASE AND PARASITES

Abbott, K. H., and Camp, J. D. **Extensive symmetrical cerebral calcification and chorioretinitis in identical twins. (Toxoplasmosis.)** Bull. Los Angeles Neurol. Soc. **12**:38-48, March, 1947.

The authors present case reports of identical twins each with bilaterally symmetrical, extensive dense calcification in the cerebrum with minor involvement of the cerebellum. Bilateral extensive chorioretinitis, with choroidal exudate associated with retinal angiomatosis was present. Since blood serum from each of the twins neutralized toxoplasma organisms it was concluded that the causal factor was probably chronic toxoplasmosis. (8 figures.) O. H. Ellis.

Appelmans, M. **Chronic superficial punctate keratitis due to onchocerciasis.** Ophthalmologica **114**:129-146, Sept., 1947.

Onchocerciasis has received a good deal of attention in the Belgian literature, apparently because of the relatively high incidence of this parasitic disease in Belgians who had spent part of their lives in the Belgian Congo. Appelmans of Louvain now describes two cases of chronic superficial punctate keratitis in former residents of the Belgian Congo. The keratitis was associated with mild ciliary injection and photophobia; all other ocular structures appeared normal. Both patients showed a chronic nodular dermatosis and marked eosinophilia in the blood. Small pieces of the clinically uninvolved conjunctiva were removed for biopsy and were found to contain innumerable larvae of onchocera volvolus. The whole subject of onchocerciasis in Africa and Central America is reviewed. The larvae reach the eye through their own motility and not through the blood stream. Their specific affinity to the conjunctiva (first described by Applemans in 1935) greatly facilitates the diagnosis. The only form of treatment known up to now is the surgical extirpation of the nodules containing the parasite. For the cases of corneal involvement without nodules in the skin the author recommends five-per cent calomel ointment applied locally. He repeatedly refers to the study of the eye manifestations of onchocerciasis in Guatemala by William B. Clark (Arch. of Ophth. **36**:644, 1946). Peter C. Kronfeld.

v. Bahr, G. **Intraocular vascular proliferations in diabetes mellitus.** Acta. Med. Scandinav. suppl. 196, pp. 24-39, 1947.

A characteristic feature of diabetes mellitus is the formation of new vessels. In the iris they are superficial and produce rubeosis iridis. These new vessels also appear in the retina and often extend into the vitreous as a retinitis proliferans. The author's cases illustrate retinitis proliferans in which the formation of new vessels is primary. Usually it is secondary to hemorrhages into the retina and vitreous. In three of the author's cases there were signs of renal damage which was very suggestive of intercapillary glomerulosclerosis (Kimmelstiel-Wilson syndrome).

New vessels are often found in the skin of diabetics and this rubeosis diabetica often gives young diabetics a red color to their face, hands and feet. The conjunctiva also may show dilated vessels with an increased number of capillary loops in diabetes. There may also be a number of military aneurysms, and a number of small vascular branches giving one the impression of vascular proliferation. H. C. Weinberg.

Ciotola, Guido. **A case of hydroa vacciniformis with ocular manifestations.** Boll. d'ocul. **25**:520-536, Oct.-Dec., 1946.

A 20-year-old farmer became affected with lesions of the skin after exposure to the sun each spring since he was six or seven years old. Serosanguinous vesicles appeared on the skin of the face and dorsal part of the hands and left scars like small pox. At the age of nine or ten years the patient's right cornea became affected by opacities which were associated with photophobia and lacrimation and occurred at the time of the skin eruption. Two years later the same opacities developed in the left cornea. The bulbar conjunctiva of both eyes at both sides of the limbus on the horizontal meridian was yellowish, slightly thickened and adherent to the sclera. The vision was 2/10 in both eyes.

The cases reported in the literature are summarized and discussed. It is assumed that the lesion resulted from the action of ultraviolet rays on a skin that is sensitized by products of altered metabolism, such as hematoporphyrin. (3 figures, bibliography.) Melchiore Lombardo.

Di Luca, Giuseppe. **Changes of ocular fundus in the diagnosis of affections of the cerebral circulation.** Riv. oto-neuro-oftal. **22**:161-176, May-June, 1947.

In a preceding work the writer called attention to a symptom complex based on the fact that when the blood flow of the carotid artery is stopped, the systolic retinal pressure of the affected side becomes lower than the systolic pressure of the other side and it remains lower on compressing the common carotid of the same side. The compression may bring about no general reaction or it may provoke symptoms of cerebral ischemia. The writer now reports four patients with general hypertension, in three of which sudden monolateral blindness occurred. The retinal artery systolic pressure was lower on the affected side. In the first patient, who had endoarteritis, the blindness was due to spasm of the central artery of the retina. A disturbance of circulation in the territory of both the internal carotid by the compression of the common carotid could be excluded. In the second and third cases no changes in the intracranial carotid territory were present. In the fourth case with normal vision in both eyes and severe general symptoms on compression of the carotid it was possible to determine that the lumen of the internal carotid was reduced in size but not occluded. The writer thinks that the compression of the common carotid is a useful functional test. (Bibliography.)
Melchiore Lombardo.

Etchemendigaray, A. N. **Changes in accommodation due to intestinal para-**

sites. Anal. argent. de oftal. **7**:125-128, Oct.-Nov.-Dec., 1946.

The author feels that intestinal parasites throw a toxin into the blood-stream that causes a temporary weakness of accommodation. He does not state conclusively whether or not these toxins act directly on the ciliary muscle or on the oculomotor center. Ten observed patients with weakness of accommodation are presented from whose intestines ameba histolytica, Giardia cysts, Blastocystis hominis, or trichomonas were isolated. No statement is made regarding response to therapy. Edward Saskin.

Focosi, Marcello. **Ocular complications of acute lymphocytic meningitis and possible connections with acute poliomyelitis.** Boll. d'ocul. **26**:417-432, July, 1947.

Two cases of benign acute lymphocytic meningitis with sixth nerve paralysis are described. All signs and symptoms disappeared rather quickly in both cases; one of them was probably due to the virus causing acute anterior poliomyelitis. (Three pages of references.)

K. W. Ascher.

Matteucci, P. **Schizophrenic syndrome and visual apparatus.** Riv. oto-neuro-oftal. **21**:312-321, Sept.-Dec., 1946.

The writer studied the ocular motility and retinal circulation in schizophrenic patients to determine whether functional and organic changes of the eye are present. In 117 patients systematic researches were made in regard to the reflexes of the pupil, the extrinsic ocular motility, the retinal circulation and the ocular tension. Only the retinal hypotension may have some importance in this syndrome. (Bibliography.) Melchiore Lombardo.

Panzardi, Domenico. **Concerning the appearance of lens opacities in target cell anemia (Cooley).** Boll. d'ocul. **26**:189-192, March, 1947.

In 1943, Holt observed lens opacities in a patient with Cooley's anemia. The author, working in Sassari, Sardinia, where the erythroblastic anemia is rather common, studied biomicroscopically the lenses of nine patients suffering from Cooley's disease. No cataracts, not even small congenital lens opacities, were encountered in all these patients. Hypocalcemia was found; cataract, however, seems to be a rare or incidental occurrence in patients suffering from target cell anemia. K. W. Ascher.

Panzardi, Domenico. **Unusual involvement of conjunctiva, cornea, and episclera in herpetic eye diseases.** Boll. d'ocul. **26**:465-470, July, 1947.

A 43-year-old woman developed in short succession transient lesions in her right and left conjunctiva, in her left cornea, and in her right episclera. A labial herpes was also observed and inoculation in rabbit cornea corroborated the assumed diagnosis of herpes febrilis. (10 references.) K. W. Ascher.

Widerman, Arnold. **Eruptive fever with stomatitis and ophthalmia.** Ann. Int. Med. **27**:830-834, Nov., 1947.

The author reports two cases of this disease also known as the Stevens-Johnson disease. The ocular symptoms and signs were itching, injection of the conjunctiva and sclera, and purulent secretion, all characteristic of moderate conjunctivitis.

Bullous lesions on the mucosa of the mouth and nose and sometimes vesicles or ulcers on the penis may occur. Constitutional symptoms are frequently present, usually severe, and are associated with high temperature and varying toxicity. Purulent conjunctivitis and corneal disease may result from secondary invaders. Panophthalmitis and even death has occurred. Stomatitis, Vincent's type especially, venereal disease, allergy, and

acute exanthemata must be differentiated from this disease. F. M. Crage.

19

CONGENITAL DEFORMITIES, HEREDITY

Beattie, P. H. **A consideration of aniridia with a pedigree.** Brit. J. Ophth. 31:649-676, Nov., 1947.

Five generations of a family with aniridia are carefully studied. Each member was not individually studied, but sufficient data were obtained from responsible sources to show that this dominant characteristic appeared in about one-half of all members. There were no cases of an affected person mating with an affected person; no consanguineous marriages were recorded. Environment was proved to have no effect whatever.

Thirty-one patients of this family group were personally studied by the author. Four patients had coloboma of iris or hypoplasia of the iris or both; ten had partial or complete aniridia of both eyes; twelve had bilateral aniridia and ectopia lentis; and one had partial aniridia in the right eye and coloboma in the left. These defects followed no definite pattern either in the same generation or succeeding ones but seemed to occur haphazardly in children of affected or normal parents. No fetal eye with aniridia became available for study and little is known about the embryology of the condition. No eye of this family became available for histologic study. As in other reported family studies of aniridia, lens opacities and glaucoma occurred much more frequently than average and the treatment of these conditions was much more difficult and associated with many more complications than usual.

Each examined member is described in detail. (58 references, 5 plates.)

Morris Kaplan.

Cohen, E. S. **A case of anophthalmia.** Harper Hosp. Bull. 5:135-138, Oct., 1947.

Microscopic examination of the tissue behind the conjunctiva failed to reveal any evidence of the layers of the optic cup. The lids and conjunctiva were normal. The left orbit was reduced in size. The optic foramen was normal on both sides. Irwin E. Gaynon.

Diethelm, W. **Ectopia lentis without arachnodactylia.** Ophthalmologica 114: 16-32, July, 1947.

The author's main point is to stress the existence of a hereditary, recessive form of ectopia of the lens and pupil without any signs of mesodermal dystrophy. In support of this view a family is described which, upon thorough examination, failed to show any signs of mesodermal dystrophy. The parents were first cousins and had normal eyes. Of the three children, one girl had ectopia lentis, one boy had ectopio lentis and pupillae and one girl had normal eyes.

P. C. Kronfeld.

Gát, L. **A case of persistent pupillary membrane.** Ophthalmologica 114:52-54, July, 1947.

Gát describes a congenital iris anomaly characterized by multiple radial white strands which take off from the ciliary portion of the iris and form a wreath-like structure in the anterior chamber in front of and concentric with the pupil.

Peter C. Kronfeld.

Hughes, H. L. **A case of bilateral coloboma of the optic disc.** Brit. J. Ophth. 31:689-692, Nov., 1947.

A patient is described who presented the typical fundus of coloboma of the optic disc. The vision in one eye was perception of light and the corrected vision of the other eye was 6/5. Many such cases of bilateral coloboma have been recorded and in most of them one eye was blind and the other exhibited nearly normal vision. The lesion is ascribed to defec-

tive closure of the optic cup at its extreme posterior position. Morris Kaplan.

Marin Enciso, M., and Lopez Gracía, E. **A case of Marfan's syndrome.** Arch. Soc. oft. hisp.-amer. 7:818-821, Aug., 1947.

A case of Marfan's syndrome with subluxated lenses and secondary rise of tension was treated by means of antiglaucomatous iridectomies, followed about a month later with lens extractions. The lenses were extracted with a Kalt forceps, one arm of which was introduced in front of the lens, and one behind it. There was no vitreous loss, and the postoperative course was uneventful.

Ray K. Daily.

Meeker, L. H., and Aebli, R. **Cyclopean eye and lateral proboscis with normal one-half face.** Arch. Ophth. 38:159-173, Aug., 1947.

A case is reported in which cyclopean eye, lateral proboscis, cleft palate and cleft lip are associated. The cyclopean eye had a double cornea, with two irises and two pupils. The involved side also showed subnormal development of the skull. There was marked mental retardation.

Comparison of this case with the cases previously reported strongly suggests that the defects are the result of incomplete separation of monozygotic twins. Hereditary influences are of importance not only in the occurrence of the individual anomalies but in the formation of the twins on which their development depends. John C. Long.

20

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Fairclough, W. A. **Industrial lighting.** Supp. New Zealand M. J., pp. 2-12, 1947.

A proper balance of light between the background and the work object secures the greatest comfort and efficiency. Visual acuity rises rapidly as illumination approaches five foot candles and then slowly until it reaches its maximum at 100 foot candles. Shadows and glare must be avoided. A daylight fluorescent lamp is most efficient. It produces one-half the total heat and one-fourth of the radiant heat of the incandescent lamp, and produces a high level of daylight quality over large areas without the use of excessive wattage or production of excessive heat.

Irwin E. Gaynon.

Kuhn, H. S. **Vision in industry.** Tr. Am. Acad. Ophth. pp. 54-63, Sept.-Oct., 1947.

In the medical and surgical care of eye injuries, the man with the injured eye should be sent promptly and directly to the plant ophthalmologist, and not first to untrained consulting physicians. Of emergency importance is the prompt and careful removal of foreign bodies, ocular and intraocular, as well as precise lid suturing. The use of ointments in caustic or acid burns is routinely discouraged.

A fair knowledge of the toxic hazards to which workers' eyes are exposed is essential. This includes not only the grouping of toxic agents physically and chemically, but also their uses in specific industries as well as their ectogenous or endogenous contact and course. Immediate and copious water irrigation is the most important factor in emergency treatment. This is best accomplished by immersing the head in a pail of water and opening the eyes. Alkali burns tend to heal slowly and imperfectly.

Close cooperation is essential for management, industrial workers and industrial ophthalmologists, and is usually best obtained through a medical director or consultant. Fact finding data secured by testing procedures should be carefully evaluated before they are used. The difference between the success and the failure is frequently determined by an understanding of the visual requirements of the operations in a plant. Although basic

principles are primarily important, their individual applications are more important. This is the lesson learned from ten years of progress in industrial ophthalmology.

Illumination and color problems are usually best solved by a consultant.

Chas. A. Bahn.

MacMillan, J. A. **Notes on the history of ophthalmology in Canada.** Am. J. Ophth. **31**:199-206, Feb., 1948. (6 references, sources.)

Pechdo, M. and Gayral, L. L. **Pathogenesis and physiopathology of nystagmus in coal miners.** Arch. d'opht. **7**:521-528, 1947.

Miner's nystagmus is a common and important occupational disease whose prophylaxis, treatment, and pathogenesis still remain unsolved. The authors state that Joseph Pechdo in 1893 postulated that toxic gases acted upon the central nervous system to produce nystagmus but that his report was neglected as a result of claims by Belgian and English ophthalmologists that faulty illumination in the mines produced the condition. Since then, however, much evidence has been advanced to support the theory of the role of toxic agents, and improved illumination alone has not reduced the incidence of nystagmus. The toxic products in coal mines are principally gaseous and the ordinary coal gas consists above all of methane but includes also hydrogen sulfide, carbon monoxide, and carbon dioxide. The gas content is particularly high in certain dead-end galleries. The authors note that certain mines are particularly apt to produce nystagmus. They conclude that treatment is primarily aeration before the nystagmus becomes fixed and that prophylaxis is entirely one of proper ventilation. Phillips Thygeson.

Price, Leo. **Eyesight conservation in garment industry.** Tr. Am. Acad. Ophth. pp. 39-46, Sept.-Oct., 1947.

The trend and purpose of industrial ophthalmology apparently includes the ophthalmic and optical examination of all employees by ophthalmologists, optometrists and other technicians; the fitting and dispensing of glasses at wholesale cost to employer or employee, job analysis, illumination problems, and more or less responsibility for the medical care of all ophthalmic and bodily diseases which might effect industrial visual efficiency. The mechanics of this program is illustrated by the experience of a large union with an organized eye and health center. Glasses were dispensed at an average cost of $5.34 per pair through the optical department. The concession privilege had previously proved unsatisfactory.

In the industrial prescription for glasses each individual should decide his specific working distance preferably by demonstration at work, and prescriptions for glasses must be in terms of specific individual requirements rather than those of the average. Especially in industrial workers past 40 years of age, exophoria may be created by indiscriminate refraction. Hand workers required fewer special working glasses because they can more frequently adjust themselves to the working distance necessitated by the lens that is worn. Workers with evidences of muscle imbalance, infections, and diseases such as cataract, diabetes, and glaucoma were treated at the Health Center or elsewhere.

This contribution should interest especially those who wish to follow the economic and technical trends and purposes of industrial ophthalmology and their relationship to the more or less socialized medicine of tomorrow.

Chas. A. Bahn.

Vail, Derrick. **The prestige of ophthalmology.** J.A.M.A. 135:71-73, Sept. 13, 1947.

The author feels that what should and does concern the ophthalmologist is the ignorance about his specialty observed in fellow physicians and the indifference they often show to his special knowledge and work. Some of the factors he believes are responsible for this decrease in ophthalmologic influence are the exclusiveness and withdrawal from the general medical field, and the segregation of his activities. The ophthalmologist's work is often performed in special eye hospitals and pathologic laboratories. The eye, ear, nose and throat specialist who is poorly qualified in ophthalmology, however capable he may be in otolaryngology, is responsible for a share of our loss of prestige. The solution lies in insisting that these men be given satisfactory training in ophthalmology. It is surprising and shocking to learn that even some physicians do not know the difference between ophthalmologist and optometrist.

The system of rebates is a blot on ophthalmologists and nothing can be said in extenuation of this widespread evil. There has been a gradual loss of part of the field of endeavor of the ophthalmologist to the neurologist, the neurosurgeon and the plastic surgeon, obviously because the ophthalmologists have not made good as a group. The solution lies in more and better training in order to offer convincing proof that the ophthalmologist knows more about neuro-ophthalmology than does the neurologist and that he can do better plastic repairs on the lids and adnexa that can the plastic surgeon. It is a sad truth that there is little ophthalmic representation in the general medical and surgical groups, and the only remedy is to take a more active part in the affairs of medical practice. Spectacular and notorious publicity can only be harmful and it is the duty of ophthalmologists as individuals and as a group to do all in their power to control it. Theodore M. Shapira.

Woods, A. C. **The present policies of the American Board of Ophthalmology.** Tr. Am. Acad. Ophth. pp. 5-15, Sept.-Oct., 1947.

A middle of the road policy is advised for the American Board of Examiners which should consider itself, and should be considered, as an agency whose duty is to determine and pass upon the clinical fitness of candidates as safe practitioners of ophthalmology. The history and accomplishments are detailed; its virtues and its potential vices are impersonally discussed.

The power which the Board has acquired should be used wisely, and not abused. Although open to criticism, the standards set by the Board have, on the whole, been reasonable and fair. Its certification indicates that the diplomate has had adequate and organized training which is presumed under normal conditions to produce a reasonably safe and competent ophthalmologist.

The one year preliminary internship is considered unwise. It tends to lower rather than to raise the level of ophthalmology for the reason that it tends to divert a number of excellent candidates from the study of ophthalmology. Forced to take this year at their graduation, they are often diverted into other fields. A properly organized service in ophthalmology should include the necessary training in general medicine and surgery. The second criticism involves all specialty boards including that of ophthalmology and is directed against their insistence on a certain basic training. These requirements are often so loosely specified that it is all but impossible to plan a program of study, or else so elaborate that they

require specially designed courses of instruction, which it is difficult, if not impossible, to obtain. The essential thing is that the candidate for certification have an adequate understanding of the basic sciences relating to his specialty, and not that he have pursued a designated course of study. A third criticism relates to the policy of some boards to insist that certification by the boards be a prerequisite for membership and promotion on hospital staffs. Education is essentially and primarily the duty and responsibility of medical schools and teaching hospitals, and not that of specialty examining boards. The continuance of this policy in teaching hospitals and research institutions will be disastrous. Many qualified investigators and specialists who services are vital would thus be debarred from entering important institutions and hospitals, and from promotion, unless they obtained the extensive clinical knowledge which the board required, much of which is relatively useless to them in the capacity they serve. The net result of this policy would be that medical schools and teaching hospitals would be sold into a form of bondage to clinical groups. Appointments and promotions would obviously be subject to the powers of an outside agency.

The last criticism is directed against the national societies, which require certification of specialty boards as an essential for membership. Although this policy tends to uphold the power, dignity and policy of these boards and insures for the membership of the societies a reasonable grade of clinical efficiency and training, it blocks the path of ophthalmic progress inasmuch as it excludes from membership specially trained men, such as pathologists and bacteriologists, who are devoting their lives to the investigations of ophthalmological problems. Each medical society should assume its own responsibility for the fitness and competence of its membership. The specialty boards are agencies whose sole duty is to determine and pass upon the clinical fitness of applicants as safe practitioners. They should not be given the right to veto candidates for membership in national societies. The national societies should admit without the distinction of class and caste, all fit medical men who are primarily interested in ophthalmology. Chas. A. Bahn.

NEWS ITEMS

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News items should reach the editor by the 12th of the month

DEATHS

Dr. William H. Chaffers, Lewiston, Maine, died November 29, 1947, aged 60 years.

Dr. William Tarun, Baltimore, Maryland, died November 21, 1947, aged 77 years.

ANNOUNCEMENTS

STUDY COUNCIL COURSE

Since the courses offered by the Ophthalmological Study Council have proved of value in enabling students to obtain residencies and to prepare for the examinations of the American Board of Ophthalmology, the council will offer another course on the basic subjects of ophthalmology at Westbrook Junior College, Portland, Maine, from June 19 to September 11. Laboratory work in pathology, optics, slitlamp, and refraction will be given. The enrollment will be limited to 100.

AEROMEDICAL RESEARCH POSITION

The Air University School of Aviation Medicine, Randolph Field, Texas, is in receipt of an announcement from headquarters, United States Air Force, that the school has been allotted one of the limited number of special research positions recently authorized by Congress to attract outstanding scientists to service laboratories. This action by the Air Force is the first of a series designed to create an Air Force Aeromedical Center capable of fulfilling the needs of that force which emerged from the war as the nation's first line of defense. It is the intention of the School of Aviation Medicine to utilize the new allocation, which carries with it a salary of $10,000 to $15,000 per anum, to establish a civilian position-vacancy for a director of research. Inquiries concerning this vacancy should be addressed to the Commandant, Air University School of Aviation Medicine (27th AF Base Unit), Randolph Field, Texas.

COURSE FOR ORTHOPTIC TECHNICIANS

The American Orthoptic Council and the Ophthalmological Study Council is offering a course for orthoptic technicians comprising: (1) Nine weeks of lectures, demonstrations, and laboratory work on the basic sciences and basic skills, to be given by six or more well-known ophthalmologists and six or more orthoptic technicians. This will be followed by: (2) Six to 12 months of practical work in clinics or private offices, learning the art of orthoptics under the most favorable conditions.

The first part of the course will be given at Nasson College in Springvale in the township of Sanford, Maine, June 28 to August 28, 1948. Tuition will be $100.00; board and room for nine weeks, $200.00.

The second or clinical part of the training will involve in some cases a fee, in some cases no fee, and in many cases a salary, especially when, after a few months' experience, the student becomes a valuable assistant.

The class in the basic subjects is not limited. The number of places available at once in offices and clinics for the second part is limited to 30 or a little more. The course, as a whole or in part, can be taken to great advantage by technicians who are not beginners but already have had experience and wish to improve their knowledge and their skill with a view to better work and a higher salary in a more desirable situation. The demand for competent orthoptic technicians far exceeds the supply.

For information or registration apply to the American Orthoptic Council, 520 Commonwealth Avenue, Boston 15, Massachusetts.

DELTA-GAMMA SCHOLARSHIPS

The Delta Gamma Fraternity has a $1,000 annual fund, from which smaller scholarship awards are available for preparation of those intending to become (1) orthoptic technicians, (2) teachers of partially seeing children, or (3) specialists for blind preschool children.

Anyone wishing to specialize in one of these fields may be eligible for assistance, the amount in each case to be determined by the particular need and costs involved. If you want to enroll for training in one of these fields, apply for a scholarship to Mrs. Richard P. Miller, 39 West Jefferson Road, Pittsford, New York.

Candidates are selected with the advice of a professional committee: Chairman, LeGrand H. Hardy, M.D., of the American Orthoptic Council; Mrs. Virginia Smith Boyce, administrative assistant, National Society for the Prevention of Blindness; Miss Ruth E. Lewis, professor of social work, George Warren Brown School of Social Work, Washington University; Dr. Berthold Lowenfeld, director of educational research, American Foundation for the Blind; Miss Ruth B. McCoy, assistant director, New York State Commission for the Blind; and Lillian Ray Titcomb, M.D., president of executive committee, Nursery School for Visually Handicapped, Los Angeles.

ORTHOPTIC EXAMINATIONS

The annual examination of orthoptic technicians by the American Orthoptic Council will be conducted in September and October, 1948.

The written examination will be nonassembled

and will take place on Thursday, September 9, 1948, in certain assigned cities and offices and will be proctored by designated ophthalmologists.

The oral and practical examinations will be held on Saturday, October 9, in Chicago just preceding the meeting of the American Academy of Ophthalmology and Otolaryngology.

Applications for examination will be received by the office of the secretary of the American Orthoptic Council, Dr. Frank D. Costenbader, 1605 22nd Street, N.W., Washington 8, D.C., and must be accompanied by the examination fee of $25.00.

Washington university course

The Department of Ophthalmology of Washington University School of Medicine, St. Louis, has announced that its annual refresher course will be given from June 7 through June 26, 1948.

The course is purely didactic, consisting of 98 hours of lectures. The subjects covered will include corneal diseases, ocular therapy, surgery, anatomy and pathology, optics, the oculorotary muscles, glaucoma, embryology, fever therapy, perimetry, neuro-ophthalmology, headache, allergy, office-laboratory procedures, industrial ophthalmology, ocular syphilis, radiology in ophthalmology, tuberculosis, dermatology in ophthalmology, and practical refraction.

The tuition is $150.00, and the only prerequisite for those taking the course is a minimum of one year's training in ophthalmology. The course is designed to refresh the busy ophthalmologist, to review candidates for the American Board of Ophthalmology, and to enable the returned physician-veteran to reacquaint himself with his specialty.

Further details may be obtained from Richard G. Scobee, M.D., director of graduate training in ophthalmology, Washington University School of Medicine, 640 South Kingshighway Boulevard, St. Louis 10, Missouri.

Miscellaneous

Eye-Bank report

At the end of its second year of operation, the Eye-Bank for Sight Restoration, Inc., New York, announced that there are now 150 hospital affiliations in the United States and that contributions through membership support have increased 50 percent. Affiliate eye banks have been established in Boston and New Orleans. It is reported that glaucoma clinics and other special types of clinics have increased in number.

Dr. R. Townley Paton, vice-president of the organization, reported that in two years the eye bank has accepted 600 eyes from the public and that 90 percent of these had been used for transplantation. Eyes that could not be certified as suitable for the operation were used for research.

Navy vision program

The U. S. Navy has adopted a comprehensive vision-improvement and eye-protection program which affects several hundred thousand civilian workers in shore establishments throughout the country, in the Pacific and Caribbean islands, and in Alaska and Panama. By direction of Under Secretary of the Navy W. John Kenney and under the supervision of Capt. E. E. Saunders (U.S.N.), contracts have been signed authorizing Ortho-Rater programs in 78 naval shore stations.

As is the case with regular vision testing programs in industrial companies, workers failing to meet visual standards of their jobs will be referred for professional eye care.

George Washington University Hospital

The eye department of the new George Washington University Hospital scheduled to open this spring will serve not only the hospital's eye patients but also those suffering from diabetes, psychiatric disturbances, high blood pressure, and other illnesses.

The new hospital building will permit the establishment of an eye department as a major department of the hospital. As such, its staff will cooperate closely with other divisions in the diagnosis of illnesses not commonly thought of in connection with the eye, according to Dr. E. A. W. Sheppard, who will head the department.

In addition to assisting in diagnosis, the department will make available for Washington eye patients the most modern equipment to test and treat eye disorders. Services will include: (1) A shop to grind lenses and fit and adjust glasses. (2) Facilities for examining and treating eye diseases. (3) A classroom where clinics will be held and undergraduate students will receive instruction. (4) An orthoptic laboratory. (5) An (eye) operating room. The opening of this operating room is expected to relieve present congestion in Washington hospitals. Time allotted for operations by eye specialists now is strictly rationed. (6) A glaucoma clinic.

N.S.P.B. test of children

Work has been started on the evaluation of methods and instruments used to test the vision of school children who may need eye care, in a study sponsored jointly by the National Society for the Prevention of Blindness, the U.S. Children's Bureau of the Federal Security Agency, and the Missouri Division of Public Health.

Six different types of tests will be used in checking the eyes of 1,200 children in 20 elementary schools in St. Louis. Teachers, nurses, and a technician will run the children through the various tests. After school personnel have completed their tests, all children will receive an eye examination by oculists at Washington University Eye Clinics. Because of the many tests and examinations to be given, it is expected that the research will take approximately a year.

Coöperating in this study, in addition to the Washington University School of Medicine, is the St. Louis City Board of Education.

Societies

Trachoma organization

The International Organization against Trachoma was founded officially by decision of the XIIIth Concilium Ophthalmologicum at its meeting at Amsterdam, in 1929, for the discussion of matters of scientific, therapeutic, and international interest connected with trachoma. The last general assembly of delegates and members was held in London on April 21, 1939. The proceedings were reported in *La Revue Internationale du Trachome* for July, 1939, and in the *British Medical Journal.*

A meeting of the executive committee of the I.O.A.T. was held in Paris on May 17, 1947. Present were Dr. MacCallan, president; Dr. Wibaut, secretary-general; Professor Nordenson, president of the Concilium Ophthalmologicum; Dr. Ehlers, secretary-general of the Concilium Ophthalmologicum; Dr. Bailliart, président de l'Association Internationale de Prophylaxie de la Cécité; Dr. Lavery, Eire; and Dr. Churchill, secretary-general, Adjoint de l'Association Internationale de Prophylaxie de la Cécité.

The quarterly journal *La Revue Internationale du Trachome,* which is published in French and in English, is the official organ of the I.O.A.T. Publication ceased during the war but is hoped to recommence shortly. Articles by members of the I.O.A.T. may be sent to: Dr. Jean Sédan, 94 Rue Sylvabelle, Marseille, secrétaire général, La Ligue contre le Trachome.

Membership of the I.O.A.T. is by an annual subscription of 25 shillings sterling; this may be paid to the account of the I.O.A.T. at the National Provincial Bank, 23 Wigmore St., London, W.I., or its equivalent to Dr. F. Wibaut, P.C. Hooftstraat, 145, Amsterdam, Nederland. Larger donations from ophthalmologic societies are invited for the purpose of meeting the general expenses of the organization.

Further information may be obtained from the president: Dr. A. F. MacCallan, Westminster Hospital Medical School, 17 Horseferry Road, London, S.W.I., or from the secretary-general: Dr. F. Wibaut, P.C. Hooftstraat 145, Amsterdam, Nederland.

Reading program

The 76th meeting of the Reading Eye, Ear, Nose, and Throat Society was held jointly with the Diplomates Association of Berks County Physicians. The speaker was Dr. Leandro M. Tocantins, associate professor of medicine at Jefferson Medical School. He spoke on "The Critical Appraisal of Available Methods for the Control of Hemorrhagic States."

Georgia annual meeting

The Georgia Society of Ophthalmology and Otolaryngology held its annual meeting at the Fulton County Academy of Medicine, Atlanta, March 5 and 6. The lecturers included: Dr. Bennett Y. Alvis, St. Louis; Dr. Arthur J. Bedell, Albany; Dr. Ramon Castroviejo, New York; Dr. J. Brown Farrior, New Orleans; Dr. French K. Hansel, St. Louis; Dr. J. Elliott Scarborough Jr., Atlanta.

Louisiana-Mississippi meeting

The Louisiana-Mississippi Ophthalmological and Otolaryngological Society will hold its annual meeting at the St. Charles Hotel in New Orleans on Saturday, April 17, 1948. The program will include: President's Address, Dr. Noel T. Simmonds, Alexandria, Louisiana; "Secretional Obstruction and Bulbar Poliomyelitis," Dr. Thomas C. Galloway, Evanston, Illinois; "The Preparation of Patients for Intraocular Surgery," Dr. Walter Stevenson, Quincy, Illinois; "The Management of Complications of Ocular Surgery," Dr. Watson Gailey, Bloomington, Illinois; The J. Raymond Hume Memorial Address—"Vertigo: Differential Diagnosis and Treatment," Dr. J. R. Lindsay, Chicago, Illinois.

Hungarian medical week

In commemoration of the Hungarian War of Liberty, the Hungarian Medical Trade Union will arrange a celebrating medical week from September 4 to 12, 1948. The Hungarian Medical Society cordially invites eminent medical personalities and practitioners of foreign countries to be present and would be greatly honored by their active participation.

Preliminary information will be sent to personal addresses, institutions, and so forth all over the world. In consequence of the war, a great part of the addresses of medical men in our possession was destroyed. For this reason it is desirable to draw the attention of the foreign medical community to the above mentioned Medical Week by means of publication in the medical press.

Program of Milwaukee meeting

The Milwaukee Oto-Ophthalmic Society held its regular meeting on February 24, 1948, at the Milwaukee Athletic Club. The Mount Sinai Hospital Departments of Ophthalmology, Otolaryngology, Radiology, Pathology, and Neurosurgery had charge of the program which included: "Introductory Remarks," Dr. M. S. Fox; "Indications for Fenestration Surgery: Case Report," Dr. Gerhard Strauss; "Encephalitis and Chiasmitis," Dr. E. E. Grossmann, Dr. Norbert Enzer, and Dr. J. Mufson; "Ocular and Nasal Findings in Lesions of the Optic Foramen: Case Reports."—Ophthalmology, Dr. S. S. Blankstein; Otolaryngology, Dr. M. S. Fox; Radiology, Dr. M. Moel; Pathology, Dr. Norbert Enzer; and Neurosurgery, Dr. J. Mufson.

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